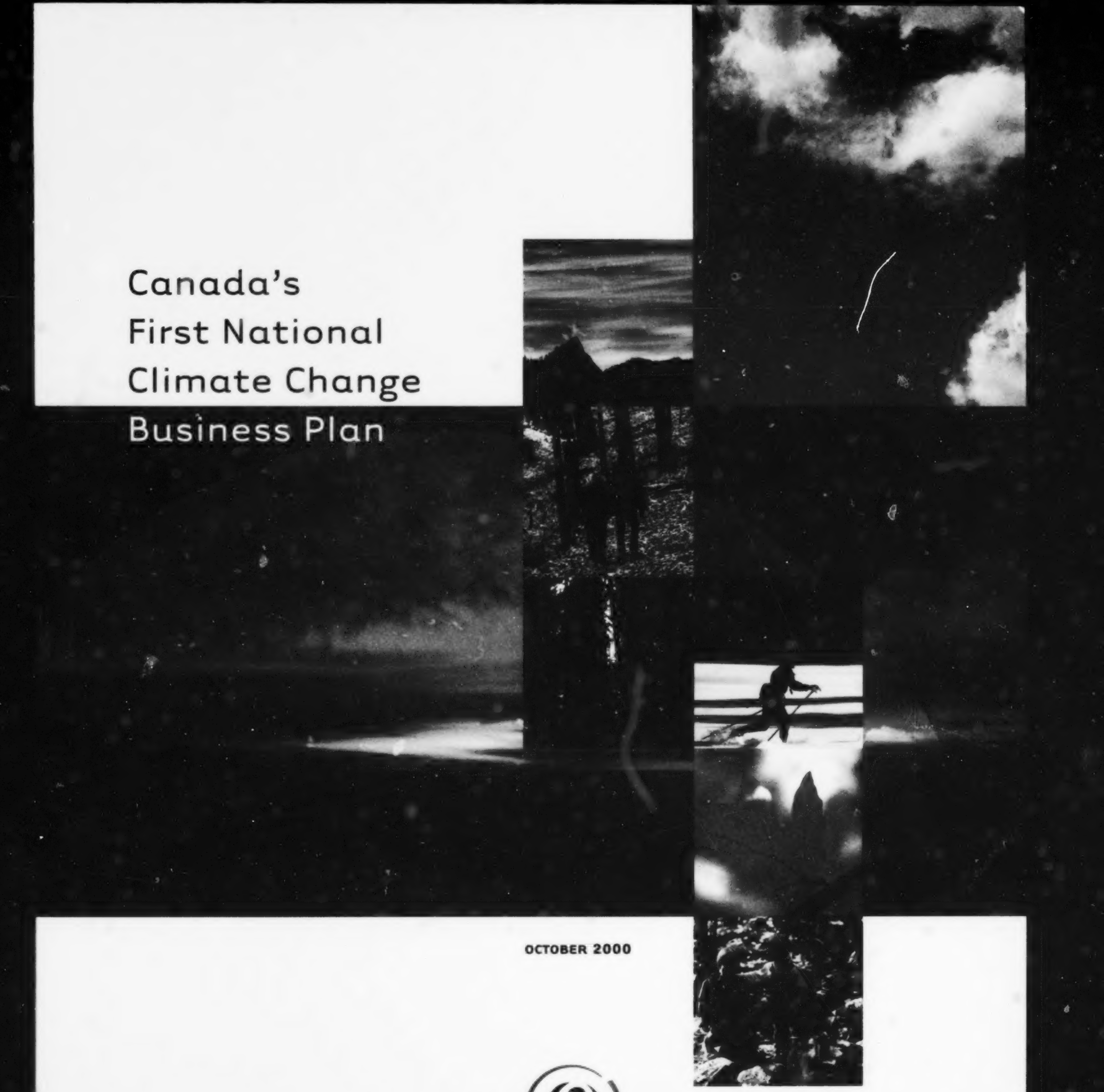
Canada's First National Climate Change Business Plan



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National
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CANADA'S FIRST NATIONAL CLIMATE CHANGE BUSINESS PLAN

October 2000

Canada's First National Climate Change

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FIRST NATIONAL CLIMATE CHANGE BUSINESS PLAN

Section I: Context

a) International

In 1992, Canada became a signatory to the United Nations Framework Convention on Climate Change (the Convention). The Convention was a milestone in a process that began in the 1980s, when scientific evidence suggested a link between anthropogenic greenhouse gas (GHG) emissions and the risk of global climate change. Opened for signature at the Rio de Janeiro Earth Summit in June 1992, the Convention came into force on March 21, 1994.

Managing the global risks of climate change is an enormous challenge. Each country committed to action will adopt approaches that reflect its geography, the unique structure of its economy and circumstances, and its pre-existing regulatory and social priorities. Accordingly, Canada's national circumstances shape its strategic interests in international negotiations on climate change. Similarly, international developments play an important part in developing Canada's domestic climate change response. Over the next decade, the actions of Canada's major trading partners will be a critical factor in decisions made by federal, provincial and territorial governments, and the private sector, to manage climate change risks while preserving economic growth and international competitiveness.

b) National

After the Third Conference of the Parties to the Convention, (i.e., CoP 3 in 1997), which agreed to the Kyoto Protocol (Protocol), First Ministers directed Energy and Environment Ministers to undertake a process that engaged governments and stakeholders, in advance of Canada's decision on ratification of the Protocol. The process was to examine the consequences of Kyoto and provide for full participation of the provincial and territorial governments with the federal government in any implementation and management of the Protocol. First Ministers also agreed that no region should be asked to bear an unreasonable burden as Canada seeks to reduce its GHG emissions.

The process engaged governments and stakeholders to:

- examine the impact, cost and the benefits of the Kyoto Protocol's implementation and of the various options open to Canada;
- prepare for the continuing international negotiations on elements of the Kyoto Protocol requiring further development;
- develop immediate actions that can be taken to provide early reductions in GHG emissions; and
- begin developing longer-term actions that will provide sustained reductions in emissions.

In April 1998, Environment and Energy Ministers responded by establishing the National Climate Change Process (NCCP). The process had the mandate to consult stakeholders, evaluate mitigation and adaptations options, and produce a national climate change strategy. Formulation of the strategy has required a major collaborative effort by governments to construct an approach for managing climate change risks that reflects the complex nature of the issue, the evolving science, Canada's role in the international community, and the Canadian constitutional framework.

The outcomes, thus far; the National Implementation Strategy and the First National Business Plan, represent a co-ordinated Canadian response to climate change with a focus on reducing national GHG emissions and developing strategies to adapt to a changing environment. This response also reflects a fundamental agreement among federal, provincial, and territorial governments about the need to act now and to continue working collectively in a spirit of trust and partnership, and with a clear, common purpose.

c) National Implementation Strategy

The National Implementation Strategy acknowledges that while climate change poses significant environmental, economic, health and social risks for Canadians, many uncertainties remain. Recognizing this, the Strategy uses a risk management approach to balance uncertainty with action. It enables actions that reduce GHG emissions, promote development of adaptation strategies, retain the flexibility to be responsive to scientific and geopolitical developments, and allow Canada to position itself to make the right decisions at the right time.

The National Implementation Strategy identifies different phases of progressive action based on decisions and assessments from domestic and international developments. Phase One of the Strategy takes place from now until the Kyoto Protocol (or another treaty) is ratified. Phase One supports actions that are cost effective, deliver important ancillary health, economic and environmental benefits, and lay a foundation for more progressive actions.

Future phases depend on decisions about the Canadian response to climate change and the nature of international commitments. For example, if Canada ratifies the Kyoto Protocol, Phase Two would cover the period required to focus on issues such as the implementation of any major economic instruments (e.g., a domestic emissions trading system) and the possible allocation of responsibility for a national emissions reduction target. Similarly, Phase Three and future phases would encompass Canada's commitment period(s), reducing emissions, and responding to evolving domestic and international circumstances.

Under the implementation framework created for the Strategy, Canada's federal, provincial and territorial governments have agreed to develop a series of business plans that will specifically outline actions to be taken individually, in partnership and collectively to respond to climate change. By adopting this approach as the basis for setting priorities, governments are positioning themselves to take individual and joint actions that reflect each jurisdiction's priorities and the timing of their decision-making processes.

d) First National Business Plan

It is envisioned that the national business plan will evolve annually, look forward on a three-year basis, and focus on priority theme areas. For the First National Business Plan, the three-year planning horizon creates a challenge in signalling areas of potential interest, when governments have yet to make firm policy and program decisions. This leads to uncertainty in identifying specific implementing authorities for actions listed in the later years of the plan.

Some jurisdictions have identified their actions for inclusion in this first integrated plan of committed and proposed federal, provincial and territorial actions. Other jurisdictions, such as Québec, have adopted the themes and objectives, in whole or in part, and identified their own business or action plans. These are appended to the national plan.

Subsequent business plans will enhance the actions of previous plans and, as each year of a plan is completed, an additional year will be added. Each plan will set clear objectives, identify specific actions to be undertaken by governments and other partners, identify further actions under consideration that require additional analysis, and report on progress. Plans will be reviewed annually and Energy and Environment Ministers will approve a new business plan each spring.

The integrated or national business plan groups actions committed to or under consideration by federal, provincial and territorial governments, according to the priorities agreed to by ministers. In some areas, the actions will require co-ordination by all jurisdictions. In other areas, co-operative actions will develop through bilateral and multilateral arrangements between individual jurisdictions.

Section II: Business Plan Overview

a) Business Planning Process: Organizing Actions Under Common Themes and Objectives

This is the First Business Plan under Phase One of the National Implementation Strategy to address climate change. It builds on more than a decade of action on climate change by all jurisdictions, including work on energy efficiency, technology development, public awareness and continuous reduction in energy and emissions intensity. Phase One is a period of progressive action to manage the risks of climate change during a period of continuing change in international and domestic policy context.

The actions identified in this plan are intended to begin to reduce Canada's emissions growth now, to advance timely and prudent efforts that can reduce the cost of future decisions, to assess impacts, to identify adaptation needs, and to prepare the basis for future decisions through analysis and options development. Proposed actions will be implemented as individual jurisdictions complete policy and program work and make policy and budget decisions.

The First National Business Plan recognizes the different budget cycles of each jurisdiction, and the differing stages of governments' consideration of individual action plans, by establishing two categories of action. "Approved and underway" includes actions that were approved in 2000 and are currently being implemented. "Under consideration" includes actions that require policy and budget approval as well as discussions between the appropriate order of governments (federal/provincial/territorial and municipal) on the merits in moving forward with any specific action.

Individual jurisdictions have identified how they plan to build on their current actions with new actions beginning in the fiscal year 2000-2001, and with possible new or extended actions later in the three-year plan. These actions were identified from a number of perspectives — building on current initiatives and on the work of the 16 Issue Tables/Groups established under the National Climate Change Process, taking advantage of least-cost reductions first, taking advantage of synergies between climate change and other objectives, and encouraging broad sectoral and consumer inclusion.

The actions build on the unique regional opportunities, challenges and potential for partnerships of each jurisdiction. They encompass decisions by individual governments concerning their priorities within their jurisdictional authority. They reflect actions which are appropriate for Phase One of the climate change response: maximizing benefits, including those not directly related to GHG reductions and those that are consistent with related health, environmental and economic goals.

The business plan is structured to highlight the comprehensiveness of Canada's climate change response, according to both theme and sector. It identifies common themes and general objectives. The themes and sectors are each described more fully in Sections III and IV. Each theme and sector within the First National Business Plan contains a series of objectives derived from the work of the National Climate Change Process. Actions have been identified under each objective according to whether they are approved and underway or are under consideration. Some objectives have no specific actions identified in this business plan. Instead, these objectives may have actions that are under consideration but not yet approved and underway, actions that will be identified in subsequent business plans of Phase One, or actions that already existed before this business plan.

However, the categorization used is discretionary and the First National Business Plan includes actions and concepts that are not confined to just one sector or theme. These include enhanced voluntary action, biological sinks, geological storage of CO_2 and renewable energy (including bioenergy and biofuels). Because they cut across themes and sectors of the First National Business Plan, actions associated with these categories are expected to be prominent in subsequent business plans and to form a foundation for Canada's climate change response.

During the course of national deliberations, five overarching objectives emerged that recur within each category of action. To reduce repetition, they are identified below and acknowledged as core objectives of the first and future business plans.

1. Reduce GHG emissions

Take action to reduce GHG emissions despite uncertainty by beginning with "least-cost" actions or those actions which deliver ancillary benefits, and proceed in a fiscally responsible, step-by-step manner towards the objective of sustained net emissions reductions.

2. Understand the impacts of climate change and develop adaptation strategies and actions

Invest in understanding the impacts of climate change in Canada, particularly in the North and other potentially vulnerable regions. Develop national and regional adaptation strategies and take action to minimize negative impacts and take advantage of opportunities.

3. Increase Canadians' understanding of the importance of climate change and encourage individuals and businesses to take action

Implement a national enhancing awareness and understanding strategy and have governments demonstrate leadership by reducing emissions in their own operations and communicate successes.

4. Position Canada to make decisions at the right time with the right information

Invest in knowledge building, such as developing modelling capacity and analyzing domestic and international policy options, and lay the foundation for future action.

5. Increase opportunities through technology

Promote technology development to help reduce GHG emissions efficiently and provide an opportunity for new business opportunities, high quality jobs, technological advancement, and increased domestic and international market potential.

b) Business Planning — Monitoring and Reporting Progress

Accompanying implementation of the First National Business Plan is the requirement to monitor progress against the overarching objectives, the thematic/sectoral objectives, and to report findings to stakeholders and the public. Under the Convention, Canada must also periodically report on its national inventory of anthropogenic emissions and the progress of policies and actions to mitigate these emissions. These obligations can now be integrated into an overall monitoring and reporting framework.

Each action in the First National Business Plan has one or more potential impacts identified by the lead jurisdiction or agency. Compiling and monitoring these impacts will form the basis of reporting on the progress of the business plan.

c) Business Planning — Continuous Improvement

The First National Business Plan is part of a unique approach to the co-ordination of a wide range of actions across a number of sectors of the Canadian economy and across the fourteen federal, provincial and territorial governments. It reveals opportunities for more co-operation and some challenges. In particular, the 2000-2001 business plan was developed and approved in the fall, out of phase with the budgetary processes of individual governments. This means that some prospective initiatives have not yet received firm policy or budget decisions.

Future business plans will be developed for decision in the spring, to be more aligned with governmental budgetary processes. Each year, jurisdictions will identify prospective mitigation, adaptation and knowledge-building actions that reflect their particular economic circumstances, environmental perspectives and overall priorities. Jurisdictions will advance actions that they plan to take individually, in partnership or co-operatively on a national basis. Canada's climate change business plans will evolve to reflect new knowledge and domestic and international developments.

Federal, provincial and territorial governments will co-operate to develop future business plans, informing interested parties and inviting stakeholder feedback. In doing so, governments also commit to the following set of common values and standards to guide their efforts:

Shared responsibility and partnership — All jurisdictions will work co-operatively to develop, implement, evaluate and report on business plans and share responsibility for the ongoing success of the business plans.

Respect for jurisdictional decision-making — Each jurisdiction, operating in its own area of competence and authority, decides how it will contribute to the common themes and objectives in the national business plan and reports on its progress. Contributions include those made individually, collectively or in partnership with other jurisdictions or sectors of the economy.

Maximum inclusiveness — All orders of government and all sectors of the economy are encouraged to contribute to the national business plan individually, collectively or in partnership. All governments will strive to enable others to take action.

Flexibility — Business plans will be flexible in terms of the kind of contributions from governments and all economic sectors.

Dynamic — Under the common set of themes and objectives, a business plan is open throughout the year to contributions of actions/measures.

Continual Improvement — Business plans will continue to be refined and improved in subsequent years as our knowledge and awareness of climate change increases.

Transparency — There will be timely, effective, accessible and open communication about business plans, including clearly defined objectives, measurable progress and regular reporting to the general public.

d) Phase One Themes/Priority Areas

Phase One of the National Implementation Strategy supports actions that are the most cost-effective, deliver important ancillary health, economic and environmental benefits and lay the groundwork for progressive action. The First National Business Plan is organized around five themes that reflect the nature and objectives for Phase One. The five themes are:

1. Enhancing Awareness and Understanding

An important initiative associated with this theme is a coordinated national network of hubs that will focus on raising public awareness of climate change issues. This is an undertaking of the federal and provincial/territorial governments, along with non-governmental and private sector partners to engage the Canadian population.

2. Promoting Technology Development and Innovation

The actions in this theme cover a range of activities. Research and development in applying new technologies that reduce GHG emissions is prominent. This includes projects for handling carbon dioxide gas streams, alternative fuels and energy sources, and fuel cell technology. Jurisdictions are also advancing regulatory and environmental tax-shifting actions that will make it easier for the Canadian industrial sector to advance and adjust to changing technologies.

Building collaboration in technology development is another important element of the strategy. It will be fostered through creating new technology networks among stakeholders, planning research and development for specific new and emerging technologies using technology roadmapping, and creating a forum for decision-makers on new developments in technology. Collaboration among governments and both private and public sector partners in developing applications of climate change technology will make solutions available to the market more quickly.

3. Governments Leading by Example

This theme addresses GHG emissions associated with government operations. Improving the energy efficiency of public buildings, including retrofits and other energy efficiency advancements, will be a major activity for several jurisdictions. Others will advance alternative fuels for government fleets or improve fleet maintenance. Some jurisdictions will evaluate district heating and other fuel conversion opportunities to meet their energy needs, while others are exploring ways to contribute within the public service (e.g., incentives for using public transit and telecommuting). Many jurisdictions see the Voluntary Challenge and Registry Inc. as an important medium for demonstrating a commitment to addressing climate change, while several governments are considering registering with the program or increasing their participation.

4. Investing in Knowledge/Building the Foundation

Efforts are underway to expand Canada's modelling and analytical capacity, to explore policy option development, to enhance climate systems science, and to do more research on climate change impacts and adaptation strategies. Jurisdictions are pursuing a number of actions to enhance the extent of their GHG inventories, data acquisition processes, micro/macroeconomic analyses, health impact and biological sinks modelling capabilities. Governments are deploying the resources needed to monitor domestic and international progress on climate change, and to research associated policy issues (e.g., domestic emissions trading, fuel cycle emissions and forests carbon measurement/management). There is also a general recognition of the importance of, and need for, a better understanding of climate system science in Canada, which in turn is fundamental to ongoing research and development of mitigation and adaptation options.

5. Encouraging Action – Sectoral, Cross-Sectoral and Cross-Cutting Actions

Sectoral Actions

Agriculture

The agricultural actions include a range of initiatives from basic scientific research to technology innovation and transfer, to adopting best management practices. Both crop and livestock production are covered. Areas of emphasis include improving our understanding of GHG emissions from agricultural sources and developing better estimates of the potential contribution that agricultural soils can make as a carbon sink. The capacity to conduct economic and policy analysis will be increased, leading to the design of better programs and instruments.

Buildings

The actions for the buildings sector come under three headings: increasing awareness of energy efficiency choices to promote informed investment decisions on residential, commercial and institutional building stock; strengthening standards and guidelines for equipment, appliances and buildings; and improving the energy efficiency of buildings in different sectors by offering information, advice and incentives.

Electricity

A key theme in this area is improving consumer and producer awareness. Actions are intended to increase cross-sectoral energy efficiency, advance new electricity generation technologies and promote use of low-GHG emitting, renewable sources of electricity. Several actions are expected to reduce net GHG emissions; one prospective technology that will be explored is geological storage of emissions from generating stations. A number of jurisdictions intend to address regulatory barriers to transmission, both within and between provinces.

Forestry

Forestry sector actions are designed to reduce GHG emissions through sequestration of carbon via enhanced silviculture activities. Forestry actions will enhance the understanding of Canada's forest sink potential and explore the role of afforestation as a climate change mitigation strategy. Forest industry (e.g. pulp and paper) emission reductions are included under the Industry sector.

Industry

The actions in this sector will build the awareness of climate change in the different industrial sectors of the economy and promote investments in energy-efficient, low emission technology. A number of actions are also intended to develop and build on existing voluntary efforts by industry.

Municipalities

The actions in the Municipalities sector will focus on raising awareness of climate change in municipal governments and communities and reducing GHG emissions from municipal operations.

Transportation

Transportation actions are aimed at three specific areas of the sector: changing public behaviour to make transportation systems more efficient, developing more efficient vehicles and increasing the use of less carbon-intensive fuels.

Cross-Sectoral Actions

Enhanced Voluntary Action

These actions target expanding the Voluntary Challenge and Registry Inc. (VCR Inc.) and address the voluntary reduction of emissions and emissions intensity through more rigorous reporting, and other programs such as the Canadian Industry Program for Energy Conservation (CIPEC).

Baseline Protection Initiative

Federal, provincial and territorial governments will implement the Baseline Protection Initiative in early 2001. The program is intended to reduce uncertainty for business, facilitate long-term corporate planning, and encourage businesses to reduce GHG emission levels.

Clean Development Mechanism (CDM)/Joint Implementation (JI)

The main focus of this category is to build the capacity of Canada's CDM/JI Office to give advice and guidance to Canadian firms to position them to take advantage of CDM/JI opportunities. Actions will also engage the private sector and developing countries to enhance their understanding of CDM/JI opportunities.

Cross-Cutting Actions

Three highly promising areas for reducing net emissions are sinks, CO_2 capture and geological storage, and renewable energy. For sinks, governments are developing a sound scientific understanding of carbon sequestration in forests and agricultural soils, and encouraging the adoption of best management practices. These actions will help advance Canada's position in international negotiations on the issue. Projects for CO_2 capture and geological storage are likely to lead to wider use in Canada, beginning with CO_2 enhanced oil recovery. Actions proposed under the Business Plan also focus on reducing the cost of renewable energy sources and broadening market access.

Section III: Broad Themes

a) Enhancing Awareness and Understanding

Canadians have a strong concern for the environment, a general awareness of climate change/global warming, but limited specific awareness and understanding of the causes, and implications of climate change as a global and national issue. Analysis indicates that enhancing public awareness and understanding, in combination with specific actions, increases take-up, action and results. Enhancing awareness and understanding is essential if Canadians are to understand possible impacts and their opportunities to reduce GHG emissions or to adapt. It is also critical in building public awareness and support for decisions on broader policies and actions in different phases of the national strategy.

Enhancing awareness and understanding will address the public in general, but primarily focus on target audiences: those involved in actions or reached through specific programs; youth, particularly in schools and educators; business and industry; municipal and community leaders; Aboriginal Peoples and media.

Implementation is primarily through a national network of regional centres (either hubs or existing networks). This strategy will deliver balanced information reflecting national/provincial/territorial priorities, interests, and opportunities. The network would be supplemented by a number of public education and outreach educational initiatives by individual jurisdictions.

Objectives and Supporting Actions

a) **To build awareness and understanding among Canadians** of climate change, including the science, impacts and adaptation and the associated environmental, economic and social issues

b) **To develop support from Canadians for policy changes and actions that will be required as part of the National Implementation Strategy**

c) **To encourage and motivate Canadians to take personal and corporate action to reduce GHG emissions**, particularly in support of actions in the business plan

Results Anticipated

Investing in education and awareness has long term payback. Within the First National Business Plan, progress would be indicated by:

- successful establishment of the public and education outreach network, with at least 4 pilots of hubs or regional networks;
- widespread participation in a branded outreach initiative; and
- increase level of awareness of climate change above polling baseline information by 2003.

Actions Approved and Underway

ALL ACTIVITIES LISTED ARE DESIGNED TO SUPPORT THE FOLLOWING OBJECTIVES:

Objective a: To build awareness and understanding among Canadians

Objective b: To develop support from Canadians for policy changes and actions that will be required as part of the National Implementation Strategy

Objective c: To encourage and motivate Canadians to take personal and corporate action to reduce GHG emissions

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Education and Awareness Hub Network	Increase awareness and action on climate change via national network and regional hubs involving private/public partnership	Joint / Intergovernmental Federal	- Increase public awareness - Shift consumer attitudes	2000-2003

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
	Partnerships including federal, provincial, local governments, industry, etc	British Columbia	Facilitate program implementation, provide technical services, community outreach, increase public awareness, community energy management planning	2000-2001
	Energy Solutions Centre – Public information and red tape reduction; co-ordinated federal / territorial program delivery $1.1 million over three years	Yukon / Federal		2000-2003
Continue Public Awareness and Education Program	Provide information about wise use of energy to all segments of the population	Joint Public / Private Northwest Territories	Increase public awareness Shift consumer attitudes	2000-2003
Circumpolar Climate Change Summit and Northern Sustainable Technology Exposition	Conference and Trade Fair	Yukon / Federal Yukon College	Increase knowledge and understanding Enhance market opportunities	2000-2001
Various Media Initiatives to Enhance Awareness (internet, television, exhibits, collateral materials, etc.)	Increase awareness and action on climate change through various media:	Federal / Joint Intergovernmental	Increase awareness Reduce GHG emissions	
	-Internet Outreach	Federal		2000-2003
	-Exhibits	Federal		2000-2001 pilot
	-Collateral Materials	Federal		2000-2003
	Knowledge Network Television series	British Columbia	Shift consumer attitudes	2000-2001
	Maintain and enhance web site on climate change and energy efficiency - $10,000	Nova Scotia		
School-Based Education and Awareness Initiatives	Student Education and Awareness (Grade 5) - A pilot school-based activity and awareness campaign dealing with climate change	Alberta	Changes attitudes	

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
	Expand Energy Management and Climate Change information in school curricula	Northwest Territories		2000-2001
ClimateWise	A community outreach project to understand barriers that inhibit Albertans from taking action and to stimulate behavioural change $10,000 (Alberta) $77,000 (Total)	Clean Air Strategies Alliance (CASA) / Alberta	Increase awareness Motivate actions to reduce GHG emissions	2000-2001 with possibility of extending program based on results achieved to 2001-2002 and 2002-2003
CCAF Partnered Projects	Federally funded, locally based outreach and education initiative	Joint Public / Private Federal	Increase awareness and motivate action to reduce GHG emissions	2000–2003
	Promote BC projects funded by CCAF-PEO; provide technical advice and support to BC-based organizations on projects receiving funding from the CCAF-PEO	British Columbia		2000-2001

Actions Under Consideration (Policy/Budget Approval Needed)

ALL ACTIVITIES LISTED ARE DESIGNED TO SUPPORT THE FOLLOWING OBJECTIVES:

Objective a: To build awareness and understanding among Canadians

Objective b: To develop support from Canadians for policy changes and actions that will be required as part of the National Implementation Strategy

Objective c: To encourage and motivate Canadians to take personal and corporate action to reduce GHG emissions

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Education and Awareness Hub Network (Pilots)	The PEO hub pilots will play the lead role in co-ordinating climate change education and outreach initiatives available in the province/region. The hub will also play a central role in identifying local gaps in Public Education and Outreach and support activities to address them	Joint Intergovernmental Alberta / New Brunswick / Nova Scotia / Northwest Territories / Saskatchewan / British Columbia / Federal / Climate Change Central supported by Alberta	Increase awareness Motivate action to reduce GHG emissions	2000-2003

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
	Establish a NWT Public Education and Outreach Hub	Joint Public / Private Northwest Territories	Increase Awareness	2000-2002 (pending policy funding decisions)
	Create 18-month pilot "hub" of independent and multi-stakeholder co-ordinating body to provide leadership in educating the public about climate change	Nova Scotia Public / Private	Reduce GHG emissions, increase awareness	2001-2002
	National advisory group to provide overall support and advice on Public Education and Outreach	Joint Intergovernmental Public / Private	Awareness and coordination	2000-2003
	Intends to coordinate the development of a network of partners to deliver education and outreach activities. It will examine the potential for the formation of an information "hub" to support the network, in partnership with the federal government and an appropriate delivery agency	New Brunswick / Federal / NGO's	Public awareness and understanding	2000-2001
	Establish a provincial hub to coordinate activities and act as a clearinghouse for public education and outreach activities in Saskatchewan	Joint Saskatchewan / Federal / Private	Public awareness and understanding	2001-2003
	The Northern Climate Exchange to become the hub for enhanced awareness and education	Yukon / Federal / Yukon College	Increase public awareness	2001-2004
School-based education and awareness initiatives	Expand Energy Management and Climate Change information in school curricula	Northwest Territories		2000-2001
Climate Change Information Projects	Provide advice and technical support to proponents seeking support under the National Climate Change Action Fund for information and education projects	New Brunswick	Public awareness and understanding	2000
Enhanced Government Communications on Climate Change	Stakeholder forum; government Website; major agricultural outreach initiative; transportation	Saskatchewan	Increased awareness	2001-2003

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
School Project Support Network	Develop a climate change support network for social studies teachers, using climate change as a teaching theme, identifying curriculum linkages, teacher training opportunities, and existing teaching resources	British Columbia	Increase awareness	
School-Based Education and Awareness Initiatives	Public awareness projects aimed at students - $15K	Public / Private Nova Scotia	Increase awareness	
Requisite Destination Conservation	As part of the Provincial Buildings Initiative and the Department of Education energy performance contract, Destination Conservation, an education and awareness program is being adopted in all NB schools $90K	New Brunswick	Youth education Energy savings Reduce GHG emissions	2000-2002
Various Media Initiatives to Enhance Awareness	Media campaign for public awareness – Provincial public awareness media campaign (radio, television and print media campaign) targeting the general public	British Columbia	Increase public awareness Shift consumer attitudes	
	Branded outreach initiative and national clearinghouse	Joint Intergovernmental	Increase public awareness Shift consumer attitudes	2001-2003
Update Public Education Materials	Update existing provincial climate change materials and develop new products as required	British Columbia	Increase public awareness Shift consumer attitudes	
Driver Education / Outreach and Awareness Program (Federal / Provincial)	Cover all aspects of vehicle/equipment ownership and operation relating to energy efficiency Integrate fuel efficiency into purchasing/procurement decisions to vehicle/equipment maintenance and operation, including driver behaviour	Alberta / Federal / Private / NGO's	Increase awareness	2000-2002
Energy Management Workshops	Develop and deliver Energy Management Workshops	Joint Public / Private Northwest Territories	GHG and other emissions affected, other environmental and social impacts	2000-2003 (pending policy funding decisions)
Conferences and Workshops	Will continue, in cooperation with the federal government, to support provincial and regional conferences and information sessions on climate change	New Brunswick / NGO's	Public awareness and understanding	2000

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Industrial Ecology Conferences	Gathering of industry, government, educational, and youth leaders in a diverse number of sectors to discuss/share ideas and successes with respect to industrial ecology Local industry access to international experts platform to share information and build the capacity and networks	Alberta / industry / educational institutions		2000-2002

b) Promoting Technology Development and Innovation

The development and application of efficient, clean and cost-effective technologies is important to all countries strategies for reducing GHG emissions. It is an essential component of Canada's strategy. At the core of this strategy is continuous innovation, increasing knowledge, building focused partnership, accelerating commercialization through demonstrations, building human resources, and enhancing the business environment for the present and the future.

In the near term, the prompt deployment of today's best technologies in each sector of the economy is one means to help Canada reduce GHG emissions. Looking forward, the development and demonstration of innovative and cost-effective technologies are broadly recognized as means to improve our capability to reduce emissions further and to enhance business opportunities for Canadian companies. This broad theme concentrates on technology development and innovation.

Canada's technology strategy for Phase One and future phases of the National Implementation Strategy is designed to ensure that new approaches and technologies are identified, then advanced through basic and applied research, and developed and demonstrated to be available for take-up.

The strategy recognises that we have to make optimum use of our national capabilities. Therefore, support for alliances amongst provincial and federal governments with the private sector and academia is a central feature of the strategy. In addition, the strategy is responsive to regional needs and recognises the need to build on regional capabilities. The strategy is also responsive to the international business opportunities for climate change technologies.

Provincial, territorial and federal governments have a suite of programs in place now to support technology development that addresses climate change priorities. Further, new progressive initiatives have recently been announced by governments, which will play important roles in providing focussed support for climate change technology projects. Among the recent announcements are Alberta's Climate Change Central, Quebec's new Technology Fund, and British Columbia's program for technology support and venture capital funding.

The federal government's suite of programs for technology innovation spans the innovation spectrum and includes NSERC, PERD, IRAP, TEAM and TPC[1]. These programs have an established track record and provide the expertise, capability and facilities to support technology research, development and demonstration in Canada. They do not have sufficient depth and resources to address the full range of climate change technologies and the need to develop them on a shorter time scale.

The recently announced Sustainable Development Technology Fund (SDTF), with initial funding of $100 million, will support private sector projects to develop and demonstrate new environmental technologies, with a particular emphasis on climate change and air quality.

The proposed strategy is specifically designed to address gaps in existing programs with selected new initiatives. The listings which follow reveal common interest among provincial and federal governments which provide an encouraging basis to move with joint actions as soon as possible. The following objectives and supporting actions have been initiated or are under development.

Objectives and Supporting Actions

a) **To foster collaborative efforts and information exchange among governments and stakeholders to advance new and emerging technologies,** taking account of domestic and international opportunities

c) **To enhance the knowledge infrastructure through new approaches to providing energy and energy end-use services** that ensure innovative technologies are available to meet emissions reduction objectives

c) **To research, develop and demonstrate new and emerging climate change technologies**

d) **To enhance the business environment through analysis of the opportunities to advance Canadian technologies and enrich the innovation system**

Results Anticipated

There are a number of positive results that will arise from implementation of the strategy. These include: advancement of new environmentally- responsible technologies; taking advantage of interests among jurisdictions in development of technologies of mutual interest; enhanced economic opportunities for Canadian companies; increased investment in the private and public sector; reinforced partnerships among industry, government and academia; better alignment with the private sector in addressing climate change issues; and helping to achieve emission reductions.

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[1] NSERC - National Science and Engineering Research Council; PERD - Program of Energy Research and Development; IRAP - Industrial Research Assistance Program; TEAM - Technology Early Action Measures; TPC - Technology Partnerships Canada

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To foster collaborative efforts and information exchange amongst governments and stakeholders to advance new and emerging technologies				
Objective b: To enhance the knowledge infrastructure through new approaches to providing energy and energy end-use services				
BIOCAP	A non-profit foundation that supports scientific technological and policy research on mitigating GHG emissions through bio-based carbon sinks energy, chemical and material resources $150,000 Alberta Government	Queens University		2000-2002
Weyburn Carbon Dioxide Injection Monitoring Project	Study interaction of carbon dioxide with rock, oil and water in reservoir; verify geological storage, environmental impact and safety $35 million total initiative $12 million private $2.5 million from Saskatchewan and $1 million federal for current phase	Joint Saskatchewan / Federal / Other Provinces / Other Countries / Private	Improved understanding of carbon dioxide injection into oil bearing geological structures Verification of storage integrity	2000-2003
New Training and Certification Programs for Trades	Increase operating efficiency of oil burning appliances Energy management plans for commercial buildings facilitating energy efficiency investments Within existing budget	Yukon		2000-2001
Objective c: To research, develop and demonstrate new and emerging climate change technologies				
Green Economy Development Fund	Provides contributions to green technology demonstration projects that are between the research & development stage and the commercialization stage $3 million	British Columbia	GHG / green technology	2000-2001
Ethanol Development Program	Initiate a provincial Ethanol Development Program (EDP) to develop commercially viable technologies that will produce ethanol from softwood residue $300,000 (provincial contribution)	British Columbia EDP is a collaboration among forest companies, the Canadian Petroleum Producers Institute, and governments	Commercially viable ethanol production from softwood residue	2000-2001

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Fuel Cell Technology Development	Continuing investment in development of BC's fuel cell technologies to a wide range of consumer products. This builds on British Columbia's past investment of $21 million since 1990 in support of the demonstration and commercialization of fuel cells	Public / Private British Columbia	Commercially viable fuel cell technology	2000-2001
Green Venture Capital Program	Help small businesses raise money for developing and selling new environmental technologies and services. Investors participating in venture-capital corporations will receive a 30 per cent provincial tax credit and will be required to hold their investments for at least five years $1 million	British Columbia	New environmental technologies and services	2000-2001
Climate Change Technology Demonstration	Demonstration of the technical and economic performance of technologies, that are on the verge of market take-up, are important to raise the awareness and confidence of end-users serving to accelerate market penetration	Federal	Advances technology from the research stage towards market readiness	Ongoing
Climate Change Technology Programs and Projects	Government's contribution to fund promising technologies and pilot projects	Climate Change Central / Alberta Innovation & Science	GHG reduction technology and demonstration	2000-2002
R&D – Wind	Continue to support R&D wind power facilities	Prince Edward Island / Federal PEI Energy Corp.	GHG emission reductions	2000-2002
	Expansion of wind research and development – Installation of 660 kW wind generator $2 million allocated	Yukon	Increase wind generation capability to 810 kW; further testing and adaptation of wind technology for Yukon applications; potential reduction in emissions of up to 1000 metric tonnes per year	2000 ongoing
Power Sales Incentive Program	Enhanced use of existing hydroelectric generation facilities. Increased power system efficiency and reductions in use of non-renewable fuels; reduction in use of diesel or propane fuels	Yukon	Secondary electricity sales	2000–2002

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
	$3.25 million allocated between 2000 and 2004 to create long-term program fund subject to annual review			
Air Emissions Regulations	Protect environment and public health by reducing environmental pollutants and GHGs Existing staff	Yukon	Regulation / Enforcement	2000 ongoing
Objective d: To enhance the business environment through analysis of the opportunities to advance Canadian technologies and enrich the innovation system				
GHG Emission Reduction Technology Showcase	Construct and maintain a GHG Emissions Reduction Technology Showcase to facilitate the transfer of technology to the potential benefit of buyers and sellers $173,000 (Alberta) $371,000 (Total) incl[illegible]ng federal funding	Environmental Services Association of Alberta	Clearinghouse of technologies for reducing GHG emissions	2000-2003
Beehive Burner Tax Shift Pilot	A tax shift pilot project to encourage value-added uses for softwood residue, including the development of technologies to produce fuel ethanol, bio-oils, other chemical by-products and electricity. Revenue-neutral using increased waste management fees to provide rebates of permit fees to operators who invest in alternatives leading to the phase-out of burners	British Columbia	Reduce GHG emissions local air quality and health benefits	2000-2001
Conversion Assistance Program	Renewable Energy Technologies - Conversion Assistance Program	Northwest Territories	GHG and other emissions affected Other environmental and social impacts	2001-2003
Sustainable Development Technology Fund (SDTF)	Will provide support ($100 million) to private sector projects aimed at advancing the development and demonstration of new environment technologies, in particular those related to climate change and air quality	Federal government to establish a third party foundation to manage the Fund	Advancement of new technologies Engagement of private sectors Support companies with technology development	To be established by end of March, 2001
Saskatchewan Petroleum Research Incentive	Provision of a royalty credit for up to 30 percent of eligible project costs to implement new technology in the oil and natural gas sector, including environmental activities	Saskatchewan / Industry	Reduce GHG emissions from oil and natural gas development	2000-2003

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
	$1.5 million per year from Saskatchewan			

Actions Under Consideration (Policy/Budget Approval Needed)

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To foster collaborative efforts and information exchange amongst governments and stakeholders to advance new and emerging technologies				
Establishing New Climate Change Technology Networks	Creation of a network of technology developers, suppliers and users to exchange information and ideas	Federal / Provincial / Territorial	Increase collaborative efforts Broaden interest and participation	First three networks in 2000-2001 Two or three per year thereafter
Road mapping of Plan to Advance New Technologies	Industry-led, often government facilitated planning exercises among (participants from industry, universities and colleges, and governments) Focused on technologies needed by a specific sector Planning the best approach to advance promising climate change technologies	Industry led Federal facilitated	Develop a forward plan for selected technologies	One new roadmap in 2000-2001 Two or three per year thereafter
Annual National Forum on Strategy	Exchange information on new climate change technologies, recent developments, and new initiatives. Each forum will address specific technology themes. One forum per year	Federal	Increase awareness of decision-makers	2001 and subsequent annual event
Objective b: To enhance the knowledge infrastructure through new approaches to providing energy and energy end-use services				
Discovery Competitions	National competitions which will engage the academic and industry research community to draw out new ideas and identify new approaches and areas of opportunity for further research	Federal	Identify new approaches Increase awareness and interest	First two competitions in 2000-2001. Two per year thereafter
Basic Research into New Technologies	Once these new approaches are identified, basic and applied research will be required to develop the scientific knowledge base and test the engineering feasibility, typically in a university setting	Federal	Advance basic ideas Test new interests	2002-2003

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective c: To research, develop and demonstrate new and emerging climate change technologies				
R&D for New Climate Change Technologies	Targeted R&D necessary to develop technology to a pre-competitive point, where it is of interest to industry. Government laboratories play a leading role, providing the needed solid foundation of experts, capabilities, facilities, and knowledge	Federal	Move technology ahead from research stage to further development	2000-2005
National Biomass Ethanol Development Centre	A national centre to promote the commercial production and use of biomass ethanol as a vehicle fuel. Activities include technology development and commercialization, policy development, and industry support	British Columbia		
Carbon Management Technology Program	CO_2 Management Strategy Develop a framework for industry-government research, involving partnerships with other jurisdictions where feasible, focused on deployment and demonstration of carbon management technologies in the energy sector	Joint intergovernmental Saskatchewan / Alberta / Other Provinces / Federal	Development of new carbon management technologies options	2001-2003
Fuel Cell Implementation Task Force	Promote fuel cell technology demonstrations. Establish a new, independent, not-for-profit corporation, Fuel Cells Canada, to support development of a world competitive fuel cell and fuel systems industry in Canada	Private / Federal	Reduce GHG emissions through development of commercial fuel technology and applications	
Expand Transportation Road Weather Information System (RWIS)	To dispatch road maintenance crews	Prince Edward Island	GHG emission reduction	2002-2003

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Climate Change Technology Group	Personnel and resources dedicated to the advancement of climate change technology	Saskatchewan	Increase development and application of technology beneficial to the climate change initiative	2001-2003
Support for Initiatives of International Test Centre for Carbon Dioxide Capture	Development of technology to reduce cost of capture technology	Federal / Saskatchewan / Industry	Reduce carbon dioxide emissions from large sources such as power plants, refineries and industrial sites	2001-2003
Support of Projects	Strategy involves a plan for working in partnership with the federal government; business and academia to develop, adapt, adopt and commercialize advanced technology. The goals, backed up by concrete action plans, are sustainable job creation and growth, an improved quality of life and the advancement of knowledge. Will support viable technological development project proposals related to climate change where economic and environmental benefits to the province are clear	New Brunswick	Advance technology	2000
Mayo to Dawson City transmission system project	Achieving projected reductions in GHG emissions. 50 percent reduction in the use of diesel generation for supply of electricity in the Yukon by use of existing surplus hydro power displacing up to 20,000 tonnes of CO_2 annually	Yukon		Tender fall 2000 and if awarded in service 2002.
Objective d: To enhance the business environment through analysis of the opportunities to advance Canadian technologies and enrich the innovation system				
Federal Showcasing	Showcasing is a means to disseminate information to the technology community and to a wider audience that include technology users	Federal	Raise awareness and interest in best practices and exemplary technologies	2000-2004

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Climate Change Technology Strategy	Through Climate Change Central, Alberta companies are working with government and academia on technological advances that will lead to improve competitiveness and other lower environmental impacts	Climate Change Central (CCC) supported by Alberta Innovation and Science	Increase awareness	2000-2002
International Market Analysis	A means to gain knowledge of international market opportunities	Federal	Strengthen the viability of the domestic capacity	2001-2005
Technology Promotion Officers	Engage officers to promote Canadian climate change technologies abroad	Federal	Access to foreign markets	2001-2005
Climate Change Technology Trade Facilitation	Support for internal linkages between technology development and international initiative	Federal	Advance international technology projects	2001-2005
Clearinghouse for Technology Information	Information on prospective technologies, identifying and prioritizing those with significant potential in Nova Scotia	Nova Scotia / Federal	Increase competitiveness Reduce GHG emissions	2001-2004

c) Governments Leading by Example

The priority attached by governments to climate change is practically demonstrated in the actions that each government takes to reduce emissions from its own operations. Canadian governments have developed action plans for submission to the Voluntary Challenge and Registry Inc. (VCR Inc.), have taken actions, and reported significantly reduced emissions from their own operations. Commercial and industrial stakeholders and individual Canadians continue to look to governments to send signals that climate change is important, by demonstrating changes in government operations and specific examples of effective action.

Governments can build on current action by demonstrating the range of actions available and exploring new and innovative ways to reduce emissions. By sharing the examples within and among governments and with interested stakeholders, communications can be reinforced, and action replicated.

In some cases, governments go beyond taking cost-effective actions within their own operations. Through procurement decisions and support for other services (schools or other institutions) they can broaden their influence. In addition, governments can support emerging new technologies or practices, in some cases going beyond the purely cost-effective in order to encourage market development.

Objectives and Supporting Actions

a) **To demonstrate leadership by**:

- taking actions which reduce GHG emissions in their own operations, including those which go beyond low cost effective actions;
- incorporating the strategic consideration of climate change impacts on new policies, programs and projects; and
- developing comprehensive action plans that qualify for the highest level with VCR Inc./*ÉcoGESte*, setting an aggressive target for reductions, and reporting on progress yearly.

b) **To catalyze demonstration and deployment of new and promising GHG reduction technologies**

c) **To develop and share expertise within and among governments** by communicating the successes of government action and encouraging other sectors to take similar action

d) **To extend awareness and expertise throughout government organizations**

Results Anticipated

Actions taken will reduce GHG emissions in government operations and links will be made between governments and experiences shared to avoid duplication of effort but also to share best practices. Actions will also encourage other sectors to reduce their emissions, establish the type of initiatives that should be taken, promote the development of new technologies and provide additional benefits, including reduced operating costs, economic development, and the reduction of other pollutants.

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To demonstrate leadership				
Energy Improvements in Funded Buildings (School modernization)	Ensure school modernization / retrofits achieve high level of energy efficiency A portion of a $170 Million fund will be used to improve energy efficiency in school buildings	Alberta / School Boards	Reduce GHG emission	2000–2002
	Continue use of the Good Buildings Practice	Northwest Territories	GHG and other emissions affected Other environmental impacts	2000-2003

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Provincial Buildings Energy Use Reduction Program	An initiative to modify or replace inefficient building systems in government owned buildings (Performance contract management)	Saskatchewan / Private	Reduction in energy use and associated emissions	2000-2003
Green Power Pilot Projects	Purchase of "green power for federal facilities in Saskatchewan and Prince Edward Island	Federal	Reduce GHG emissions from federal electricity use	10-year purchase from 2001
Alternative Fuel Vehicles	In 2000-01, the Ministry of Transportation and Highways purchased 150 natural gas or propane vehicles to replace aging vehicles in its fleet	British Columbia	Reduced government GHG emissions	2000-2001
Northwest Territories Energy Efficiency Package	Implement a Package of new Energy Efficiency Initiatives designed specifically to reduce the consumption of energy in Government of NWT assets	Northwest Territories	GHG and other emissions affected Other environmental impacts	2000-2002
Northwest Territories Housing Corporation Plans	NWT Housing Corporation	Northwest Territories	GHG and other emissions, environmental and social impacts	2000-2001
Reduce Idling in Government Vehicles		Yukon Community and Transportation Services	Reduced fuel use Improved winter air quality Public awareness	To start winter 2000/01
Energy Conservation Program	Provide funding assistance to carry out energy saving renovations	Northwest Territories	GHG and other emissions affected Other environmental and social impacts	2000-2003
Northwest Territories VCR Plan Update	Update the GNWT Voluntary Challenge and Registry (VCR) Plan	Northwest Territories	GHG and other emissions affected Other environmental and social impacts	2000-2001

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Ride Sharing through Prince Edward Island Enerpool	None other than rebate on diesel tax	Prince Edward Island	Reduce GHG emissions	2000-2002
Promote Teleworking for Provincial Civil Servants		Prince Edward Island	Reduce GHG emissions	2000-2002
Objective b: To catalyze demonstration and deployment of new and promising GHG reduction technologies				
Residual Heat and District Heating	Development of new and expanded Residual Heat and District Heating Systems	Joint Public / Private Northwest Territories	GHG and other emissions affected Other environmental impacts	2000-2001
Natural Gas Conversion Assistance Program	Inuvik Natural Gas Conversion Assistance Program	Joint Public / Private Northwest Territories	GHG and other emissions affected Other environmental impacts	2000-2001
Objective c: To develop and share expertise within and among governments				
Objective d: To extend awareness and expertise throughout government organizations				

Actions Under Consideration (Policy/Budget Approval Required)

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To demonstrate leadership				
Alberta VCR Action Plan	Renew the Government of Alberta's commitment and establish post-2000 GHG reduction target for government. Operations : - Pilot "best in class" leasing standards and retire oldest, least efficient vehicles - Conduct waste audit to assess extent of government recycling - Government building retrofit Educate government staff on climate change to stimulate personal action to reduce GHG emissions at work, on the road and at home	Alberta	Reduce GHG emissions Demonstration of sound technologies and practices	2000-2002
Nova Scotia VCR Initiative	Submit progress report to attain "champion" status	Nova Scotia	Reduce GHG emissions	2000-2003
British Columbia Action Plan	Prepare an inventory of government-source GHG emissions, baseline forecast of emissions and an action plan which will be submitted to Canada's Voluntary Challenge and Registry Inc. by Ministries and individual Crown Corporations	British Columbia	Reduce GHG emissions	2001
Saskatchewan Internal GHG Initiative	Establish policies and infrastructure to reduce government emissions of GHG in buildings and transportation	Saskatchewan	Reduction in GHG emissions by government and employees Purchase of green power for government buildings	2001-2003
Fleet Maintenance and Management	Fleet management	Prince Edward Island		2002-2003
Nova Scotia Retrofit Government Buildings	Improve energy efficiency in operations and set an example for energy efficiency improvements	Nova Scotia	Reduce GHG emissions	2001-2004
Energy Management in Funded Buildings	Improve energy efficiency of new and existing hospitals, schools, municipal buildings, and subsidized housing	Joint Initiative Saskatchewan / Municipal / Federal / Private	Reduced energy use and improved indoor air quality	2001-2003
Provincial Buildings Initiative	New Brunswick launched this successful energy management program in 1995 and will continue to expand its scope to Crown	New Brunswick	Reduce Energy and GHG emissions	2001

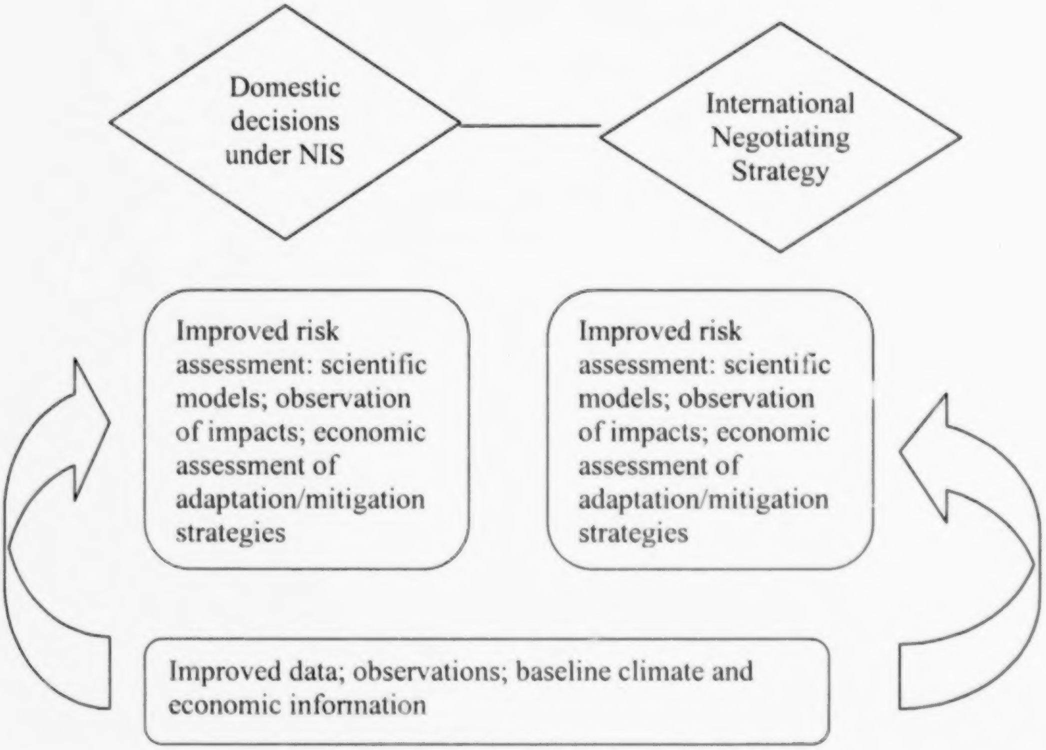
Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
	Corporations and leased space, and to vehicles and equipment procurement Enhanced monitoring technology of energy consumption and its integration into regular government functions will be pursued. The program will be promoted to municipalities and other organizations			
Establish Climate Change Impacts as Part of Government Decisions	Impacts on GHG and climate change will be added to the list of evaluation criteria on cabinet documents required for approval of major government initiatives	Nova Scotia	Reduce GHG emissions	2001-2004
Objective b: To catalyze demonstration and deployment of new and promising GHG reduction technologies				
Federal House in Order Initiative	Revise federal target allocated to biggest departments, building retrofits, fleet efficiency, alternative fuels and green power procurement	Federal	Reduce GHG emissions Demonstration of Practices	2000-2005
Build Green Power Capacity and Purchase Green Power	Expand opportunities for emerging renewable and non GHG-emitting sources of electricity by purchasing electricity from these sources for federal initiatives and displacing purchases from high-carbon sources. Build on pilot funded in the 2000 Federal Budget (see also electricity actions)	Federal / Joint Intergovernmental	Reduce GHG emissions	2001-2005
Alternative Fuels Initiative	Demonstration of alternatives fuels such as ethanol or CNG in government fleet	Saskatchewan	Demonstrate feasibility of alternative fuels for fleet use	2000-2003
Objective c: To develop and share expertise within and among governments				
Partnerships and Leverage	Support proposals for federal funding assistance by New Brunswick organizations for greenhouse reduction and climate change adaptation projects	New Brunswick / NGO's	Reduce GHG emissions	2000 +
Agreement with Federal Government	Pursue an agreement with the federal government that addresses jurisdictional authority in delivery of climate change mitigation and adaptation measures, resource requirements (funding), analytical needs, and provincial input to international negotiations	New Brunswick	Leverage multiplies effectiveness of encouraging action to reduce GHG emissions	2000 +
Objective d: To extend awareness and expertise throughout government organizations				

d) Investing in Knowledge/Building the Foundation

Investing in Knowledge/Building the foundation is essential to realization of the dynamic risk-management approach of the National Implementation Strategy. Canada has needs to enhance its capacity for scientific, technical and economic analysis among federal and provincial/territorial governments, universities and the private sector. Internationally, Canada is a significant contributor to climate system science, the international network of climate observation, and the overall analytic program of the Intergovernmental Panel on Climate Change.

In Canada, the National Climate Change Process encouraged analytic collaboration among agencies and advanced our understanding of impacts, risks, and the challenges and opportunities associated with adaptation and mitigation. It also identified a variety of needs:

- focussing resources on climate-related science, impacts, adaptation and mitigation issues;
- developing collaborative work plans and sharing of resulting information to enhance analysis and policy formulation to better inform domestic and international decision-making;
- ground-truthing analytic results with national and regional stakeholders;
- building national networks, which allow regional responses to unique opportunities.


Domestic decisions under NIS
International Negotiating Strategy
Improved risk assessment: scientific models; observation of impacts; economic assessment of adaptation/mitigation strategies
Improved risk assessment: scientific models; observation of impacts; economic assessment of adaptation/mitigation strategies
Improved data; observations; baseline climate and economic information

The Investing in Knowledge/Building the Foundation theme focuses efforts on improving data, broadening observations, developing networks, and enhancing scientific and economic models and methods. This work will prepare for domestic decision-making under the National Implementation Strategy and international negotiations through: improved understanding of the consequences of and options for action; enhanced scientific awareness of climate change risks and impacts.

Objectives and Supporting Actions

a) **To model and analyze the national, regional and sectoral economic, environmental, and social costs/benefits of climate change actions**

b) **To facilitate policy options development and assessment** to position Canadian governments and stakeholders to make informed domestic and international decisions at the right time

c) **To inform Canada's international climate change negotiations and reporting obligations and ensure domestic actions account for international developments**

d) **To facilitate increased scientific understanding of climate change and its impacts** as the basis for developing appropriate mitigation and adaptation options

The preceding objectives, and the expected results from actions approved and underway and those under consideration, are described more fully in the following sections:

a) **To model and analyze the national, regional and sectoral economic, environmental, and social costs/benefits of climate change actions**

This objective responds to the need to improve data, expand analytic capacity and modelling, coordinate work plans, collaborate across governments and with stakeholders, to develop better baseline understanding and the capacity to assess the environmental, economic, social and competitiveness implications of various options for mitigative and adaptive action.

Identified priorities include developing clearer, more disaggregated analysis; developing a better understanding of competitiveness — understood both economy-wide and sectoral basis. Key to this objective is collaboration in analysis and sharing of results to develop common understanding.

Results Anticipated

Actions underway and under consideration will improve Canada's data and modelling capability with regard to climate change and will provide the basis for:

- better advice, on a disaggregated and sectoral and jurisdictional basis, with respect to domestic policy and program options;

- improved assessment of competitiveness, trade and investment implications of various policy options;
- a full understanding of the role of technology in achieving climate change objectives; and
- an enhanced ability to assess the environmental and health implications of actions taken to reduce GHG emissions.

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To model and analyze the national and regional economic, environmental, and social costs/benefits of climate change actions				

Actions Under Consideration (Policy/Budget Approval Needed)

Action Name	General Description	Implementation Authority	Impact of Action	Implementation Timing
Objective a: To model and analyze the national, regional and sectoral economic, environmental, and social costs/benefits of climate change actions				
Expanding Capacity for Economic Analysis	Develop provincial resources for analysis of economic impacts of emissions reduction programs and the design of economic instruments Provincial analysis would build on the national economic analysis and provide detail on issues specific to Alberta's key economic sectors	Alberta	Capacity to assess impacts of different climate change scenarios	
Data Development	Accurate and more detailed data in a number of areas including, for example: - Energy Balance; - Energy Intensity; - End-Use Energy; - Forest Inventory; - Agriculture; and - Transportation	Federal Provincial involvement in Forestry, Agriculture and Transportation	Provide better decision-making on climate change	2000-2003
Modelling	Expansion and deepening of modelling capacity in such areas as: - Macroeconomic; - Energy Technology; - Transportation; - Agriculture; - Forestry; and - EHI	Federal Provincial involvement for Energy Technology, Transportation, Forestry and Agriculture	Provide advice on economic and environmental implications of a range of domestic policy options and program designs	2000-2003

b) **To facilitate policy options development and assessment** to position Canadian governments and stakeholders to make informed domestic and international decisions at the right time

There is a need to develop common understanding of options and their impacts to facilitate individual and collective decision-making and development of Canada's international negotiating positions. This includes assessment of options such as allocation, domestic emissions trading, sink enhancement and incentives. Discussion and analysis of allocation, emissions trading and other policy approaches begins as part of the first business plan, to inform future decisions under the National Implementation Strategy, in particular decisions to move from phase to phase.

Preliminary analysis of domestic emissions trading has begun. Pilots are currently testing voluntary emissions reduction trading. Alternative mandatory trading mechanisms have been identified for further analysis. These involve alternative approaches to allocating permits and broadening inclusion from large users to other sectors. Jurisdictional roles, authorities and responsibilities will need to be addressed. Work will also address the particular challenges of internationally competitive sectors, whether competing directly with developing countries currently not facing emission targets, or with US-based enterprises, and the need for comparability in policy frameworks.

Another focus area involves the enhancement of forest and agricultural sinks. Analysis is required to map sink potential and understand carbon stock changes related to forest and agricultural activities. This analysis will both inform international negotiations, and promote development of systems to measure, verify and report changes to carbon stocks from reforestation, afforestation and deforestation (RAD) and other activities in the managed forest, as well as corresponding changes in agricultural and forest soils.

Under the National Climate Change Process, exploration and development of policy options has benefited from considerable stakeholder input and this is expected to continue.

Results Anticipated

The work on options development, analysis of related issues, and analytical review of various policy approaches such as allocation and domestic emission trading, will provide the public and governments with a much improved basis for understanding that potential, in the Canadian context, for achieving a commitment period GHG emissions reduction target. While an important input to eventual decision-making, this work will only be one input to a broader process that can be expected to include:

- further quantitative modelling and analysis capacity;
- intensive consultations with stakeholders and the public;
- analytical review of alternative broad strategies involving different domestic emission trading/allocation approaches combined with different sets of additional measures; and

- federal, provincial and territorial discussion of the relative roles of the different jurisdictions, under alternative broad strategies, to achieving emissions reductions target.

Further, many jurisdictions have proposed to undertake the development of systems to measure and report changes to carbon stocks, full cycle emissions and overall GHG emission inventories.

Actions Approved and Underway

Action Name	General Description	Implementation Authority	Impact of Action	Implementation Timing
Objective b: To facilitate policy options development and assessment to position Canadian governments and stakeholders to make informed domestic and international decisions at the right time				
Forests – Carbon Management Accounting Framework	Develop standards for carbon measuring, reporting and monitoring with links to national standards. Investigate enabling forest companies to submit operational data for automatic processing / reporting. Research soil carbon storage to develop regionally specific conversion factors. Investigate legislative changes to establish non-timber Rights to sequestration credits	British Columbia	Carbon management within forests sector	2000-2001
Forests –Sinks Estimation	Using a Canadian Forest Service's national carbon emissions model, analyze carbon emissions for tree farm licenses and timber supply areas under combinations of potential accounting rule scenarios. Clarify BC's sink/source position under potential Kyoto outcomes	Joint / Intergovernmental British Columbia	Regional / provincial understanding of British Columbia's sink / source position	2000-2001
Increased Policy and Analytical Capacity	The Province has enhanced resources, effective 2000-01, for policy development and analysis in support of BC's climate change strategy	British Columbia	Increase policy and analytical capacity	2000-2001
Energy and Environment Background Paper	Assessment energy utilities issues in NWT	Nunavut		2000

Action Under consideration (Policy/Budget Approval Needed)

Action Name	General Description	Implementation Authority	Impact of Action	Implementation Timing
Objective b: To facilitate policy options development and assessment to position Canadian governments and stakeholders to make informed domestic and international decisions at the right time				
Understanding Emissions Intensity of Alberta Energy Production within a	Develop improved understanding of full fuel cycle emissions associated with Alberta oil and gas production – within the context of	Alberta / Canadian Association of Petroleum	Increase knowledge	

Action Name	General Description	Implementation Authority	Impact of Action	Implementation Timing
Global Context	full-cycle emissions associated with Alberta's oil and gas competitors	Producers		
Domestic Emissions Trading (DET)	Analysis work areas to include: - further work on AMG paths with different DET components - feasibility of various gratis permit allocation options - harmonization with U.S. DET - emissions measurement, and 'broad' vs. 'narrow' DET coverage - interaction: DET and other measures that might ease transition to DET	Federal / Provincial / Territorial		2000-2001 2001-2002
Forest Carbon Credits and Trading	Investigation of legislative changes required to facilitate forest carbon credits and trading	British Columbia		
Inclusion of Adaptation in the Management Framework	Establishing mechanisms to examine the development of adaptation strategies	Federal / Provincial / Territorial	Enhance guidance to adaptation strategy development	2001-2002
Policy Analysis	Coordination of efforts among various federal and provincial departments and agencies, and strategic partnering with them, is needed to assemble the required resources and to consolidate results of analysis on various economic sectors that are meaningful in a provincial policy context. This should be a key component of a framework agreement with the federal government	New Brunswick	Inform decision making	2000 +
Forests – Soil Carbon Estimation	Plan, design and develop a field sampling program aimed at installing a series of monitoring stations in the biogeoclimatic zones over a two-year period with the objective of confirming and/or adjusting national-scale estimates of soil carbon	British Columbia	Increase the level of information	
Energy Accounting Program	Expand and enhance the Government energy accounting program to track energy consumption and report information to users. Forms the basis of government related air emissions monitoring	New Brunswick	Inform energy and emissions management GHG reduction Confirmation of results	2001+
GHG Emissions	Nunavut to develop a fair, cost-	Nunavut	Develop strategy	2001-2002

Action Name	General Description	Implementation Authority	Impact of Action	Implementation Timing
Control Strategy Development	effective, comprehensive GHG strategy. Includes stakeholder input			
Improve GHG Inventories	Require more detailed reporting of GHG emissions by emitters	Joint Federal / Intergovernmental Initiative Saskatchewan	Identification of provincial emitters	2001-2003

c) To inform Canada's international climate change negotiations and reporting obligations and ensure domestic actions account for international developments

The international community is currently focused on development of rules and frameworks for actions to reduce GHG emissions under the Kyoto Protocol. In the short-term, a number of issues with respect to the Protocol remain to be resolved. These include elaboration of the Kyoto Mechanisms, the inclusion and calculation of carbon sinks, and the development of a compliance regime for the agreement. Some of the measures on data development and modelling, noted under objective (a) above, will also be useful in informing negotiations and helping to meet Canada's international reporting obligations under the Kyoto Protocol.

However, climate change remains a long-term issue that will continue to evolve under the Convention recognizing that it is a global issue with all nations and regions of the world contributing to varying degrees to global GHG emissions. Addressing climate change could have fundamental impacts on the Canadian economy, particularly how energy is produced and consumed. Consequently, in addition to considering its potential vulnerabilities to climate change, Canada must also consider the impacts of potential mitigation and adaptation actions on its economic infrastructure and international competitiveness, particularly in relation to its major competitors.

International climate change negotiations under the Convention are expected to continue over the long-term. While they are currently focussed on elaboration of the Kyoto Protocol, increasingly they are expected to address the global nature of climate change – both with respect to impacts and the need for adaptation, as well as the contribution of all countries and regions to the reduction of the emissions. Canada will need to continue to invest in the climate system science; technical and economic analysis necessary to both develop and support its international negotiation positions and to contribute to broader international understanding of climate related issues.

In addition, it is important to ensure that stakeholders' views are heard and taken into account in the development of Canada's international policy and positions. Numerous mechanisms have been used for this purpose – most recently the International Climate Change Consultative Committee has been established, engaging governments and non-governmental organizations.

Results Anticipated

Scientific, technical and economic analysis of policy options and actions will provide the foundation for Canada's negotiating objective for CoP 6 and beyond by:

- providing policy capacity to develop and advance Canada's negotiating positions;
- enabling active, effective participation in the international processes;
- informing the development of domestic strategies and decisions (e.g. DET and sinks);
- ensuring a strong linkage between international positions and domestic strategy and action; and
- informing and consulting with stakeholders with respect to federal negotiating positions.

d) **To facilitate increased scientific understanding of climate change and its impacts** as the basis for developing appropriate mitigation and adaptation options

The provision of a sound scientific foundation is essential in taking decisions on reducing emissions, adapting to climate changes, informing domestic and international negotiations, and engagement of the public. The primary objectives in development of climate change science are to monitor the state of the climate to inform Canadians and provide suitable baselines; to understand the functioning of the climate system; and to improve the ability to model and make projections of future climate change for the benefit of the impacts and adaptation analysis.

The field of climate impacts and adaptation is relatively new and covers a vast range of listed sectors and topics. Past investment in this field has identified broad sensitivities to climate change across Canada, but less attention was paid to understanding our capacity to adapt.

However, parts of Canada are already experiencing the impacts of a changing climate while, at the same time, decisions are being made about expensive infrastructure investments that will be expected to last 40 years or more.

Canada's high northern latitudes, large geographic extent, and natural resources reliance create a particular sensitivity to climate change impacts. Canada's northern territories may well be "bellwethers" for climate change. Climate science that begins with monitoring the state of the climate, developing climate baselines, and projecting scenarios of changes can be used to develop appropriate adaptation and mitigation strategies.

In the First National Business Plan, the climate science component will provide information that will contribute to both mitigation and adaptation by:

- improving understanding of how our climate is changing now and the processes affecting that change;
- providing more detailed estimates of source/sinks potential; and
- enhancing modelling capacity to provide scenarios of future climate changes.

The impacts and adaptation component of the Plan will set the stage for a proactive approach to adaptation decision-making by:

- improving the organization of the research community to expand research capacity, facilitate collaboration with stakeholders and increase awareness of the issue;
- increasing the amount of research focused on climate change impacts and adaptation, particularly for sectors or jurisdictions making decisions with long-term implications, or those developing strategies in response to climate problems during the next 5-10 years; and
- periodically assessing the state of our knowledge of impacts and adaptation, in advance of major decision points in the development of the national strategy.

Objectives and Supporting Actions

d i) **To provide essential information on what is happening to the climate, how it operates and how it can be modelled to make useful projections**

d ii) **Improve the organization of the research community**

d iii) **Increase research focused on climate change impacts and adaptation**

d iv) **Periodically assess state of knowledge of impacts and adaptation in advance of major decisions**

Results Anticipated

Investment in climate change system science will:

- improve knowledge of past, present and future states of the climate as input to impacts and adaptation studies;
- enhance estimates of biological GHG sources and sinks in order that Canada can better utilize them in meeting emission reduction targets; and
- result in more detailed, better quality emissions inventories on a regional and sector basis.

Further research into climate change impacts and development of adaptation strategies will:

- contribute to a more complete understanding of the longer term sectoral, regional and national impacts of climate change; and
- help to develop jurisdictional adaptation priorities and strategies.

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective d i) : To provide essential information on what is happening to the climate, how it operates and how it can be modelled to make useful projections				
National Climate Modelling Capacity	By the end of 2003, hire and support 3 or 4 key experts in ocean circulation, biogeochemical cycles, chemistry/climate interactions and land surface processes 2000/01: research effort funded by CCAF	Federal / Provincial		2000-2001
Agricultural Soil Carbon Sequestration Potential in British Columbia	Research will enable development of a policy for the accounting of agricultural soil sinks. Alternative cropping practices will be identified for areas with a potential to increase soil organic matter. Broad costs for alternative practices and potential carbon credit value will be estimated	British Columbia	Understanding British Columbia's sequestration potential	2000-2001
National Association for Systematic Climate Observations	Start to correct the gaps in systematic climate observations and data dissemination in Canada (completed by 2005)	Federal / Provincial / Territorial	Improve awareness	2001-2002: National Association established
National Strategy On biological GHG Sources, Sinks and the Carbon Cycle Science	Develop and implement a National Strategy for a science effort on biological GHG sources, plus sinks and carbon cycle - by 2004 re: key ecosystems in Canadian forest and agriculture - by 2005 carbon- cycle model University component expected to be partially funded by CFCAS	Provinces and Universities (building on the BIOCAP initiative) Federal		2000-2001: modest effort funded by CCAF 2000-2003
Objective d ii): Improve the organization of the research community				
National Climate Scenarios Facility, with a National Users Board	Provide information at regionally useful scales to jurisdictions across the country as input to climate impact and adaptation studies	Federal		2000-2001: modest effort funded by CCAF; 2001-2003: potentially funded by renewed CCAF

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective d iii) : Increase research focused on climate change impacts and adaptation				
Adaptation Research	Adaptation in BC's fishery sector: BC is studying the impacts of climate change on species composition, abundance, and habitat, as well as stream fertilization and other mitigation measures. To offset losses in the salmon harvest, new fisheries are being developed (e.g. hake, mackerel and squid) and a provincial policy has been released to facilitate aquaculture development. Gene banks have also been established for threatened species	British Columbia	Adaptation strategy for British Columbia	2000-2001
	Prairie Adaptation Research Co-operative – Development of strategies and incentives for adapting to climate change on the Prairies $40K - $60K per year from Saskatchewan and $3 M over 3 years from CCAF	Joint initiative Saskatchewan / Federal / Alberta / Other Provinces	Reduce impact of climate change on the Prairies	2000-2003
Land-Use Inventory of Forest and Agricultural Plots	Measure and establish parameters and baseline data of soil quality, including total organic carbon, to position for sequestration	Prince Edward Island		2000-2002
Objective d iv) : Periodically asses state of knowledge of impacts and adaptation in advance of major decisions				
Greater Vancouver Regional District / Provincial GHG and Air Pollutant Reduction Analyses	An assessment of options to reduce air pollutants from every significant source sector in the Greater Vancouver region, including an estimate of GHG reductions, reductions of other air contaminants, estimated costs of reduction, and associated benefits. (Phase 1 of a larger project to assess options for the Lower Fraser Valley, with possible future extension to other urban regions)	British Columbia / Regional District	Air quality improvements Public health impacts	2000-2001

Actions Under Consideration (Policy/Budget Approval Needed)

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective d i) : To provide essential information on what is happening to the climate, how it operates and how it can be modelled to make useful projections				
Objective d ii) : Improving the organization of the research community				
Climate Change Impacts and Adaptation Research Network (C-CIARN)	Creation of network nodes Federal / Provincial / Territorial / Universities / Private sector participation in nodes & management	Federal / Provincial / Territorial / University	Improve co-ordination and collaboration	Start 2000-2001
Science, Impacts and Adaptation	An initiative to develop a better understanding of potential climate change impacts, and increase communications between scientists and decision-makers responsible for the management of key resources	British Columbia Public / Private	Integrate impact assessments	2001-2004
Promote Research on Science, Climate Change Issues	Promote research on science, climate change issues through MOUs with Universities on Climate Change; participation in science network	Nova Scotia / Federal	Reduce GHG emissions Increase competitiveness and investment in climate change	
Capacity Building	Additional Impact & Adaptation researchers	Federal	Capacity to address Impact & Adaptation needs	2001-2002 Pending policy funding approval
Objective d iii) : Increase research focused on climate change impacts and adaptation				
Impacts and Adaptation Research Programs	Enhanced I&A Research Program - To provide preliminary estimates of I&A costs; - Infrastructure projects to include adaptation considerations; - Communities adaptation strategies	Federal Alberta	Information for adaptation decision making and national assessments	2000-2002+
	Encourage research on climate change impacts and adaptation – Encourage research institutions, NGO's, and industry associations to do research on climate change impacts and potential adaptation actions	Nova Scotia		2001-2004
	Expand Knowledge of Science, Impacts and Adaptation aspects of climate change	Northwest Territories / Federal	Development of adaptive climate change strategies	2001-2002 Pending policy funding decisions

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
	Initiative to mitigate impact of climate change through development of adaptive strategies	Joint Initiative Federal / Other Provinces	Development of adaptive climate change strategies	2001-2003
Objective d iv) : Periodically assess state of knowledge of impacts and adaptation in advance of major decisions				
Assessment of Impacts and Adaptation	Publication of assessments	Federal / Provincial / Territorial / Universities Federal	Improve understanding of the risks of climate change for Canada	Start 2000-2001

Section IV: Encouraging Action — Sectoral Actions

A) Sectoral Actions

a) Agriculture

Canada's agricultural sector is comprised of approximately 280,000 farm businesses, 98 percent of which are family owned. Like other sectors, the agriculture sector could be seriously affected by climate change through changes in temperature, precipitation, diseases and overall crop yields.

Agriculture accounts for less than 10 percent of Canada's GHG emissions. Unlike other sectors, emissions are almost completely from non-energy sources. Nitrous oxide from fertilizers and manure, and methane from livestock account for 96 percent of emissions, with the balance comprised of mainly carbon dioxide. The relative uncertainty of measuring nitrous oxide and methane emissions is much greater than for carbon dioxide. Agricultural soils have significant potential to store carbon, acting as a sink for atmospheric carbon. Emission sources/sinks differ on a regional basis due to variations in agricultural practices and emphasis on livestock or crop production. Between 1990 and 2010, overall emissions in the sector are projected to rise from 61 to 72 megatonnes, driven largely by the food demands of a growing world population.

Many of the actions to reduce emissions in the agriculture sector are also good environmental and economic practices and are already being promoted for ancillary benefits such as soil and water quality and lower input costs. Based on the current level of understanding of agricultural GHG emissions, there are practices that can be promoted now to reduce emissions, but considerable research is needed on the interaction of the three gases and to support the development of new technologies and practices. Promising areas are fertilizer management, livestock systems (feeding, grazing, manure) and soil management (including increasing soil organic carbon).

Meeting the demands of a growing world population for food is a fundamental driver of growth in production and GHG emissions for agriculture. Given the disaggregated and diverse nature of the sector, it is difficult to measure and monitor emissions from the many non-point sources.

Some of the key challenges are:

- many farmers are limited in their capacity to adopt new management practices and invest in new technologies because of the current price cost squeeze in their operations;
- more research is needed to provide a better scientific understanding of nitrous oxide and methane emissions and reduce uncertainties in measurement; and
- agricultural soil sinks are not yet recognized under the Kyoto Protocol, in anticipation of this recognition, actions need to be taken now to provide opportunities for producers.

Objectives and Supporting Actions

The following objectives and actions address upstream agricultural activities only (primary production); vehicle emissions, including tractors, are covered by the transportation sector and value-added processing is included in the industry sector.

a) **To advance the development and demonstration of new and emerging agricultural technologies** to reduce and monitor GHG emissions (link to Promoting Technology Development and Innovation theme)

b) **To increase research capacity and coordination** to position the agriculture sector to respond to climate change. Advance scientific research on agricultural emissions, adaptation, and sinks and improve modelling and analysis capabilities in support of policy development (link to Investing in Knowledge/Building the Foundation theme)

c) **To identify best practices that support climate change mitigation and adaptation**, and other economic and environmental objectives. Through education and awareness, enhance the agriculture sector's ability to adapt to climate change using sustainable farming systems (link to Enhancing Awareness and Understanding theme)

d) **To position producers to seize the opportunities from the potential inclusion of agricultural soils as a sink** in the Kyoto Protocol (link to science sub-theme)

Results Anticipated

Jurisdictions taking or proposing action are acquiring a better understanding of GHG emissions from agricultural sources as well as the potential contribution that agricultural soils can make as a carbon sink. This improved scientific knowledge will be applied to the development, demonstration and transfer of new, effective technologies and best management practices that provide important ancillary benefits (notably improved air and water quality). Outreach and demonstration initiatives will increase awareness and understanding and promote the adoption of these technologies and practices by producers. The capacity to conduct economic and policy analysis will be increased, leading to the design of better programs and instruments.

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To advance the development and demonstration of new and emerging agricultural				
Improved Crop and Livestock Genetics	Development of improved plants and livestock to increase efficiency of production	Saskatchewan / Federal / Private	Improve yield per unit of energy input Reduce GHG emissions	2000- 2003
Integrated Pest Management Crops	Increase use of integrated pest management crops to reduce pesticide use	Joint Saskatchewan / Federal / Private	Reduce pesticide use Reduce GHG emissions	2000 –2003
Objective b: To increase research capacity and coordination to position the agriculture sector to respond to climate change				
Research Capacity	Climate Change Funding Initiative-Canadian Adaptation and Rural Development Fund (CARD) $4M	Federal / Industry / Academia Delivered by Canadian Agri-Food Research Council (CARC)	Refine inventories Technology availability	2000-2004
Establish Climate Change Outreach and Research Centre	At Nova Scotia Agriculture College $250K	Joint Public / Private Nova Scotia		
Plot Surveys		Prince Edward Island	Carbon Dioxide	2000-2003
Objective c: To identify best practices that support climate change mitigation and adaptation.				
Best Management Practices	Agriculture Environmental Stewardship Initiative-Canadian Adaptation and Rural Development Fund $10M (only a portion targeted to GHG reduction)	Federal / Industry / Academia – Delivered by CARC	GHG and other emissions reduced Other environmental benefits Competitiveness	2000-2003
	Agricultural and Environmental Resource Conservation (AERC) approved	Prince Edward Island		2000-2003
Livestock Management Practices	Livestock Environmental Initiative-Canadian Adaptation and Rural Development Fund (research, development & outreach) $1.3M	Federal / Industry / Academia (delivered by Canadian Pork Council)	GHG and other emissions reduced Other environmental benefits Sectoral Impacts Competitiveness	2000-2001
	Livestock management and grazing management	Prince Edward Island		2000-2003

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Provincial Strategy for Sustainable Manure Management	Review management of manure to provide plant nutrients and soil organic matter	Join Saskatchewan / Federal / Private	Replacement of inorganic fertilizers Improve soil organic matter	2000 –2003
Crop Nutrient Management	Review fertilizer application practices and other techniques for managing soil fertility	Join Saskatchewan / Federal / Private	Reduce N_2O emissions Improve soil health and productivity	2000 –2003
Pulse and Legume Crop Diversification	Encourage rotation of pulse and legume crops to fix nitrogen from air and reduce summerfallow	Joint Saskatchewan / Federal / Private	Replacement of inorganic fertilizers Local value added processing; reduced summerfallow acres	2000 –2003
Public Outreach	Countryside Canada- (promotes conservation practices) $600K	Federal / Industry / Academia (delivered by Wildlife Habitat Canada & the Canadian Federation of Agriculture)	Recognition and award program for on-farm / ranch stewardship	2000-2003
Alberta Communication Strategy for Agriculture	Alberta Environmentally Sustainable Agriculture Program (AESA) $20K	Alberta / AESA Council	Enhance awareness of GHG reducing management practices for producers and processors	2000-2001
Alberta GHG Program for Agriculture	Alberta government Team interfaces with industry to address climate change issues for agriculture $600K	Alberta / Private sector	Work with Industry to develop communication materials, climate change strategies and better GHG projects	2000-2004
Objective d: To position producers to seize the opportunities from the potential inclusion of agricultural soils as a sink				
Education and Awareness	Climate Change Skills & Transfer Program-Canadian Adaptation and Rural Development Fund $464K	Federal / Provincial / Industry / Academia – Delivered by Soil Conservation Council of Canada (SCCC)	Sinks enhanced Reduce GHG and other emissions Other environmental impact Competitiveness	1999-2003
Soil Conservation	Changing agricultural practices, including reduced tillage $50K - $150K	Joint implementation – Federal / Saskatchewan / Private Saskatchewan	Carbon sequestration Reduce soil erosion	2000-2003
Other Programs to Improve Sustainable Management of Lands and Agriculture Production	Reduced straw burning, conversion of marginal lands, processing crop residues	Saskatchewan / Private	Increase carbon sequestration Avoid emissions of methane and N_20	2000-2003

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Improved Grazing Management	Advise producers on methods to increase biomass on pasture and increase soil organic matter	Joint Saskatchewan / Federal / Private	Increase soil organic matter Reduce GHG emissions	2000 –2003

Actions Under Consideration (Policy/Budget Approval Needed)

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To advance the development and demonstration of new and emerging agricultural technologies				
Objective b: To increase research capacity and coordination to position the agriculture sector to respond to climate change				
Basic Research	Improve understanding of biochemical processes in GHG production; assess data gaps and biological sink potential through demonstration farms	Federal / Provincial / Industry	GHG reduction tools Refine emission inventories	3 year program
Basic and Applied research for Alberta producers	Basic and applied research to better understand GHG emissions from agricultural sources, awareness knowledge gaps and develops innovative cost-effective technologies to reduce GHG emissions from agriculture	Alberta / Federal / Universities / Applied Research Organizations / Alberta Environmentally Sustainable Agriculture Council (AESA) Industry	Increase understanding of agricultural GHG emissions Promote sustainable management agricultural practices	2000-2003
Modelling	Quantification and verification of emission factors from practices used in models	Federal / Provincial / Industry	Increased model precision	3 year program
	Fill Data Gaps (cross reference: Investing in Knowledge/Building the foundation)	Federal / Provincial / Industry	Sectoral impacts Competitiveness	3 year program
	Improve modelling (cross reference: Investing in Knowledge/Building the foundation)	Federal / Provincial / Industry	Sectoral impacts Competitiveness	3 year program
	Economic instruments (cross reference: Investing in Knowledge/Building the foundation)	Federal / Provincial / Industry	Sectoral impacts Competitiveness	3 year program
Policy Instruments	Exploring options for economic, regulatory and voluntary instruments (similar initiative for processors in Industry section)	Federal / Provincial / Industry	Better understanding of implications for sector of policy instruments	3 year program

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
"GHG Green" Products	Market research to determine if Alberta products (raw/value added) would be welcomed as "GHG Green" in domestic and international markets (link to processing related actions in Industry section)	Provincial / Federal / Industry Alberta Food Processors Assoc. (AFPA) / Alberta Environmentally Sustainable Agriculture Program Council	Competitiveness Improved market access Linkage between primary and secondary production streams (i.e. value chains)	3 year program
Objective c: To identify best practices that support climate change mitigation and adaptation				
Nutrient Management Practices	Promote best practices for fertilizer form, placement, amount and timing; nutrient management planning	Federal / Provincial / Industry	Reduce GHG emissions Efficiencies Competitiveness	3 year program
	Soil Nutrient Efficiency	Prince Edward Island		2000-2003
Livestock Management Practices	Promote best practices for livestock management systems (feeding, grazing, manure)	Federal / Provincial / Industry	Reduce GHG emissions Better feed conversion efficiencies Improve manure management Competitiveness Other environmental benefits	3 year program
Education and Awareness for Food Producers	Raise awareness and understanding of how adopting GHG reducing management practices now can save money in the future	Provincial / Federal / Industry Alberta Environmentally Sustainable Agriculture Council (AESA)	Enhance Awareness Comprehensive set of information tools available to Alberta producers	2000-2003
Modifying Agricultural Best Management Practices	Identify Best Management Practices and new technologies for reducing GHG emissions through GHG life cycle analysis	Provincial / Federal / Industry / Alberta Reduced Tillage Initiative (ARTI)	Reduce GHG emissions Improve awareness Competitiveness On-farm tool to evaluate costs / benefits of managing GHG emissions	2000-2003

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Consultation and Extension on Agricultural Practices	Workshops and information sessions to explore agricultural practices that reduce or sequester GHG emissions	British Columbia	Improve knowledge	
Agriculture Initiatives	Many farm practices that enhance the sustainability of agricultural systems also contribute to the reduction of GHG emissions Support proposals to strengthen the adoption of new technology, to improve the education and awareness of livestock producers on Best Management Practices that reduce odour and methane emissions, and to advance the proper storage and handling of manure Similar initiatives for crop producers to reduce nitrous oxide and CO_2 emissions and to sequester CO_2 in soils	New Brunswick	Reduce GHG emissions	2000+
Objective d: To position producers to seize the opportunities from the potential inclusion of agricultural soils as a sink				
Biochemical Mechanisms for GHG Resources and Sinks	Develop verification, measurement and mitigation technology to determine sink value of agricultural soils	Federal / Provincial / Industry	More accurate estimate of sink value of agricultural soils in Canada	2001-2005
Soil Management Practices	Promote best practices for enhancing soil quality	Federal / Provincial / Industry	Soil carbon sinks enhanced Other environmental benefits including runoff nutrients into water Competitiveness	3 year program
Position Alberta Producers to Take Advantage of Carbon Sink Opportunities	Position the agricultural sector to take advantage of agricultural sink opportunities through emissions credit trading should such an option become available	Alberta / Federal / Industry Climate Change Central / Alberta Environmentally Sustainable Agriculture Council (AESA)	Increase information / awareness of risks / opportunities of trading / Mechanisms for recognizing action taken to date	2000-2003
Support Research and Extension for Alberta Producers	Ensure policies facilitate not hinder research and extension that will give producers the tools they need to implement innovative cost effective technologies from agricultural	Alberta		2000-2004

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Education and Awareness Program for Food Producers	Raise awareness and understanding of how adopting management practices to reduce GHG emissions now can save money in the future	Alberta		2000-2004

b) Buildings

Buildings account for just over 10 percent of Canadian GHG emissions. The buildings sector represents an opportunity area to further improve energy intensity using more efficient equipment, improving new construction practices and retrofitting existing buildings. Considerable existing efforts have already been undertaken, particularly for residential buildings.

However, energy use is distributed over a very large number of buildings. Most of the buildings that will exist in 2010 are already built. The most cost-effective way to implement energy efficiency actions is at the construction stage or when equipment is being purchased. Undertaking of energy retrofits at the time of renovation is the most cost-effective way to improve performance of existing buildings.

Objectives and Supporting Actions

a) **To promote good consumer choices through education and awareness and utilize existing expertise** in different areas of construction, design and maintenance of commercial/residential/institutional building stock

b) **To improve best practises in development of equipment for existing and new commercial/residential/institutional building stock**

c) **To improve energy efficiency for existing and new commercial/residential/institutional building stock**

Results Anticipated

Actions taken will result in a number of positive impacts that include: increase consumer awareness vis-à-vis alternate choices when investment decisions are being made; enhanced best practices in developing more efficient equipment to be used by the different sectors; and improvement of the overall energy used in the different sectors.

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To promote good consumer choices				
House Calls Energy Efficiency Program	Residential focused public information and education and product installation (hot water tank wraps and fluorescent bulb) in 2000 residential dwellings primarily in rural communities $310,000	Yukon / Federal / Yukon Energy Corporation / Yukon Electrical Company Limited through Yukon Conservation Society	Reduction of 893 MWh of power generated by diesel and 675 tonnes of $C0_2$	2000-2001 +
Objective b: To improve best practices in development of equipment for existing and new commercial/residential/institutional building stock				
Energy Efficient Lighting in Small Commercial Sector	Encourage the use of EE lighting in small commercial sector through audits, workshops, and information under Light 3Better for Less Program $100,000	Nova Scotia	Reduce GHG emissions	
Energy Conservation Program	Provide funding assistance to carry out energy saving renovations	Northwest Territories	GHG and other emissions affected Other environmental and social impacts	2000-2003
Renewable Energy Deployment Initiative (REDI)	Support industry infrastructure development, marketing, and incentives	Federal	Reduce GHG emissions Awareness Cost effectiveness	Funding extension approved in Budget 2000 2001-2004
Objective c: To improve energy efficiency for existing and new commercial/residential/institutional building stock				
Energy Efficient Housing	EnerGuide for Houses - Energy efficiency of existing housing improved	Federal / Territories / Provinces / Private Federal	Reduce GHG Emissions	2001-2004
	Promote energy efficient houses through support for R-2000 Home program, Home, Tune-ups, EnerGuide for Houses and education of new construction and renovation industry $350,000 for all participants	Joint Public / Private Nova Scotia	Reduce GHG emissions Improve awareness and understanding	

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Green Buildings British Columbia – Retrofit Program	The Retrofit Program provides an opportunity for provincially-funded care institutions to upgrade their facilities with energy and water efficiency enhancements, as well as waste-saving actions. (The retrofits will pay for themselves through savings they generated)	British Columbia	Reduce GHG emissions	2000-2001
Green Buildings British Columbia – New Buildings Program	Implement a policy to "green" all new government-funded public buildings. Develop facilities, within existing capital budgets, that are more resource-efficient	British Columbia	Reduce GHG emissions	2000-2001
New Commercial Buildings Incentive Program	New construction Incentives for design of new institutional and commercial buildings 25 percent or more energy efficient than the Model National Energy Code for Building (MNECB)	Federal	Reduce GHG Emissions	2001-2004
New Energy Targets for New Buildings	New buildings built to the Model National Energy Code for Buildings (MNECB) and attempt to meet the Commercial Building Incentive Program (CBIP)	Nova Scotia	Reduce GHG emissions Challenge buildings sector	2001-2004
	New building energy requirements: Government Services adopted requirements for design of new buildings to fully investigate energy option Within existing budgets and projects supported by Power Sales Incentive Program	Yukon	Reduce costs Reduce GHG emissions	2000-2001
Energy Efficiency Standards for New Schools	New standards and Guidelines have been created for the building of new schools and modernization of existing ones	Alberta	Reduce GHG emissions	2000-2003
Energy Innovators Plus	Incentives, benchmarking	Federal	Reduce GHG Emissions	2000-2004
R-2000, EnerGuide for Houses, Residential Rehabilitation Assistance Program (RRAP)	Improve energy efficiency of new and existing housing $40K – $100K	Joint initiative Saskatchewan / federal / Private	Reduce GHG emissions Improve indoor air quality	2000-2003

Actions Under Consideration (Policy/Budget Approval Needed)

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To promote good consumer choices				
Energy Efficient Housing Promotion	New housing: promote construction & purchase of energy efficient housing; house labelling; move conventional practice towards R-2000; housing codes Existing housing; support evaluation based on EGH rating tool; promote retrofit activity; encourage best practices, set retrofit guidelines	Federal – scope for provincial involvement (esp. Regulatory)	Reduce GHG Emissions	2000-2004 Pending policy decisions
EnerGuide for Houses Program (Voluntary)	To raise consumer awareness and facilitate consumer choice in housing	Newfoundland	Increase awareness Improve energy efficiency and reduce GHG emissions	2001-2002
Consumer Information on Energy Efficiency Opportunities	Establish an information service to provide Albertans with information on energy efficient home practices	Alberta / Climate Change Central	Public Utilizing service have capacity to achieve 10-20 percent energy savings	
Objective b: To improve best practices in development of equipment for existing and new commercial/residential/institutional building stock				
Energy Efficiency Standards for Equipment and Appliances	Re-establish the energy efficiency standards function of provincial government, conduct a comprehensive review of current standards and determine requirement for new / revised regulations	British Columbia	Reduce GHG emissions	
Higher standards for Equipment & Appliances	Equipment & Appliances: Higher standards, expanded reg. Coverage; endorsement labelling program for high energy efficiency equipment	Federal / Provincial / Territorial	Reduce GHG emissions	2000-2001 2000-2004 Pending policy decisions
Objective c: To improve energy efficiency for existing an new commercial/residential/institutional building stock				
Commercial-Institutional Retrofit Initiative	Information, advice, incentives	Federal – scope for provincial involvement	Reduce GHG emissions	2000-2002
Industrial Buildings Incentive Program	New construction incentives for design of new industrial buildings 25 percent or more energy efficient than the Model National Energy Code for Buildings (MNECB)	Federal	Reduce GHG emissions	2000-2004
Adopt Energy Efficiency Building	Adoption of Energy Efficiency Building Codes	Northwest Territories /	GHG and other emissions	2002-2003 Pending policy

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Codes		Municipalities	affected Other environmental impacts	funding decisions
Office of Green Building Technologies	Implement green building standards for all new buildings; create an internet clearing house for information on green building practices; produce a series of green building practices guides; develop a rating system for new and existing buildings, design and build a show-case building within 2 years; deliver the Green Buildings provincial programs (retrofits and new buildings)	British Columbia	GHG / green building technology demonstration projects GHG reductions	
Green Buildings Partnership	Accelerate the adoption of a green building ethic among government agencies and the building industry. Identifying and working to remove barriers and defining priority technologies warranting further research. Include provincial ministries and agencies responsible for capital planning; the building industry; educators; and local government	Public / Private British Columbia	Identify regulatory barriers Identify / promote priority green building technologies	
Support Audits Based on EnerGuide for Houses (EGH) Rating Tool	Existing housing: Support audits based on EGH rating tool; Promote retrofit activity; encourage best practices, set retrofit guidelines	Federal – scope for provincial involvement	Reduce GHG Emissions	2000-2004 Pending policy decisions
Upgrading / Implementing Building Codes for Houses	Engage all governments in discussion on the upgrading of the model National Energy Code for Houses and its adoption and implementation	Federal / Intergovernmental	Reduce GHG emissions	2001
Commercial Buildings Incentive Program	Encourage participation in the program and other initiatives to encourage construction of energy-efficient building	Nova Scotia	Reduce GHG emissions	2001-2004

c) Electricity

Electricity generators play an integral role in Canada's climate change strategy as energy consumers, developers of low GHG emitting sources of supply, and as participants in any potential domestic/international emissions trading scheme(s).

Various regions of the country have different primary sources of energy available for electricity generation. Therefore, provincial electricity systems have evolved around these resources. Responsibility for electricity generation, transmission, distribution and markets generally lies with the provinces, although the federal government can exercise jurisdiction where electricity crosses provincial or international borders. Historically, provinces have attempted to be self-sufficient in electricity generation capacity. As a result, there is limited infrastructure for transporting large quantities of electricity between provinces. The restructuring of the electricity sector in some jurisdictions is changing the traditional role and structure of utilities, opening markets and offering both challenges and opportunities.

The greatest potential for emissions reductions appears to reside in the electricity generation sector. Between 40 percent to 60 percent of the reductions could potentially be achieved by CO_2 capture and storage and increased reliance upon non/low GHG source electricity. Electricity generation accounted for 16 percent of direct emissions in 1997 and is projected to increase to 22 percent by 2010. The sector is also an emitter of smog, acid rain related pollutants, mercury and other air toxics. Federal and provincial governments have established targets to reduce emissions of these pollutants and are beginning to develop related sector strategies (i.e. Canada-Wide Standards).

Reducing emissions from electricity generation requires replacing existing generation capacity with new, lower-emitting facilities. The opportunities for GHG reductions vary by region, but range from replacing coal, oil and old gas-fired plants at the end of their economic lives with new, higher efficiency, combined cycle or cogeneration gas plants, or with generation capacity using renewable and/or low emitting energy sources (e.g., wind, solar, hydroelectricity and nuclear). The early retirement of existing plants may involve considerable cost; therefore, realizing regional opportunities may involve overcoming a number of different obstacles, including stranded capital investment, regulatory barriers, lack of research and development, and lack of public acceptance.

Objectives and Supporting Actions

a) **To integrate climate change considerations into short and long-term business decisions regarding capital investments, operations and processes** through changes in tax treatment, GHG emissions equivalence performance standards, sectoral covenants, and participation in voluntary programs (e.g., VCR Inc. and *ÉcoGESte*)

b) **To promote low-GHG emitting energy sources** through recognition of regional differences and advancement of the use of renewable energy (including hydro), cogeneration, innovative approaches to reducing emissions from electricity generation, elimination of regulatory barriers, and research, development and demonstration of emerging low-GHG emission technologies, and advancement of green power marketing

c) **To incent improved energy-use and energy-management practices of local distribution companies**, recognizing regional differences (e.g., demand side management programs, performance-based regulation)

d) **To facilitate efficient energy-use behaviour of electricity consumers and the increased choice of alternative low emitting electrical energy sources** (e.g. public/private partnerships to finance and deliver efficiency programs to utility customers, encourage market development and demonstration projects of on-site renewable energy systems, stationary fuel cells, etc.)

Results Anticipated

The actions underway and proposed for the electricity sector will increase sectoral energy efficiency and advance new electricity generation technologies. Several actions are also expected to provide net reductions in GHG emissions for the sector. Enhanced consumer awareness and improved regulatory processes have also been identified by some jurisdictions as desired outcomes within the first business planning period.

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To integrate climate change consideration into short and long-term business decisions regarding capital investments, operations and processes				
BC Hydro Offset Program	BC Hydro has committed over $2 million for the purchase of GHG offsets over the 2000-2001 time frame	British Columbia – Utility	Reduce GHG emissions	2000-2001
SaskPower Climate Change Action Plan	Internal efficiencies to reduce emissions; programs to improve efficiency of customers; offset projects; R&D	Saskatchewan	Goal of reducing GHG emissions by 1.2 million tonnes	2000 –2003
Offset Programs	TransAlta has signed an agreement to purchase up to 2.8 million tonnes of carbon emission reduction credits from farms in the U.S. TransAlta led the GEMCO consortium in the purchase	TransAlta and GEMCO partners	Reduce GHG emissions	2000-2008
Small Hydro Policy	Reduce water rental fees to stimulate the development of new small hydroelectric projects	British Columbia	Reduce GHG emissions	2000-2001
Environmental Review Processes	While maintaining level of protection: Improve the review process through the Five Year Review of the Canadian Environmental Assessment Act (CEAA) Improve coordination among jurisdictions	Federal and Joint Inter-governmental	Reduction in regulatory uncertainty	CEAA consultations complete, preparing recommendations
Fly Ash Utilization	TransAlta, ATCO Electric and EPCOR are actively involved in selling rather than landfilling their fly ash	TransAlta / ATCO Electric / EPCOR	Reduce GHG emissions	Ongoing

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
VCR Action Plans	NWT Power Corporation continues with their VCR Action Plan – Continue and expand plan to reduce GHG emissions as outlined their latest Action Plan registered with the VCR	NWT Power Corporation		2000-2001
Objective b: To promote low-GHG emitting energy sources				
Green Power Procurement and Renewables	BC Hydro "Green Power" Procurement 10 percent of all BC Hydro's new generation resource acquisitions will be new "green" resources (i.e. renewable, socially responsible, licensable, and having a low environmental impact)	British Columbia – Utility	Reduce GHG emissions	2000-2001
	Alberta's Small Research and Development Act Provides opportunity for new renewable energy project developers with legislated price in long term power purchase agreement	Alberta	Reduce GHG emissions	Ongoing
	Green Power Pilot Projects Purchase of green power for federal facilities in Saskatchewan and Prince Edward Island (See also Governments Leading by Examples section)	Federal	Reduce GHG emissions from federal electricity use	10-year purchase from 2001
	Promote and participate in development of renewable energy sources	Joint Public / Private Newfoundland	Reduce GHG and other emissions Health risks reduced Other environmental impacts	Granite Canal – Ongoing
Monitor and Implement Improvements to Low GHG Generating Options	Monitor efficiency of existing low GHG generating options and implement improvements to reduce the need for fossil fuelled generation	Public Newfoundland	Reduce GHG and other emissions	Ongoing

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
BC Hydro "Energy Futures Program"	Identify realistic green energy options, including green energy supplies, new products or services, and new business ventures. (Wind, micro-hydro, woodwaste, community energy planning and green energy certification). Two wind monitors have been installed to evaluate the viability of wind as an energy resource in British Columbia. Three more wind monitors will be installed across the province in the next year	British Columbia – Utility	GHG emissions reductions	2000-2001
Objective c: To incent improved energy-use and energy-management practices of local distribution companies				
Objective d: To facilitate efficient energy-use behaviour of electrical consumers and the increased choice of alternative low emitting energy sources				
Efficient Energy Use	Facilitate efficient energy use/ behaviour of customers Energy audit program designed to identify energy inefficiencies to customers and to provide advice on measures available to improve energy efficiency	Joint Public / Private Newfoundland	Reduce GHG and other emissions	Underway
	Monitor efficiency of fossil-fuelled generation and make improvements to reduce the volume of fuel burned	Public Newfoundland	Reduce GHG and other emissions	Ongoing
	Secondary energy purchases purchased overproduction of energy at customers' hydroelectric generating stations in order to displace generation at our fossil fuel plant	Public Newfoundland	Reduce GHG and other emissions	Ongoing
	Public Awareness and Outreach Improve the knowledge of stakeholders on GHG related issues These include dissemination of printed information and publication of an environmental performance report	Public Newfoundland	Increase awareness	Ongoing

Actions Under Consideration (Policy/Budget Approval Needed)

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To integrate climate change consideration into short and long-term business decisions regarding capital investments, operations and processes				
Sector Covenant / Agreement	Work toward sectoral agreements to reduce emissions from high-carbon sources. Linked to Canada-wide standards implementation process on air emissions	Federal / Provincial / Intergovernmental and Industry	Reduce GHG emissions	Under development
CO_2 Capture and Storage	Create inventory of stationary sources, and storage capacity and characteristics, of coal deposits and saline aquifers. (See also Technology and upstream oil and gas actions) and expand CO_2 capture and storage to incorporate sources from coal-fired electricity generation facilities	Joint Public / Private Federal	Increase knowledge	Pending policy and funding decision
Objective b: To promote low-GHG emitting energy sources				
Distributed Generation	Remove Interconnection Barriers: - Build on EPCOR's net-metering pilot by examining barriers associated with distributed generation from variety of sources, possibly including flare gas generation, residential / commercial developments and agricultural initiatives (renewable, biogas)	Private Sector Alberta	Lower overall emissions Improve market access for distributed generation	2000-2002
	Net Metering for Smaller Systems – Develop and adopt guidelines for the interconnection of small distributed generating systems	Joint Public / Private Federal	Reduce GHG emissions Market access for distributed generation	Pending policy and funding decision
	Address technical, business, and regulatory barriers to distributed electricity generation and central heating plant (CHP) projects	Joint Public / Private Nova Scotia	Reduce GHG emissions	
On-site Generation	Install emerging, non-GHG-emitting technologies on government properties in off-grid and demonstration applications.	Federal / Joint Intergovernmental	Reduce GHG Emissions Government leadership facilitates other sales	Pending policy and funding approval
Consumer Information on Generation Mix	Encourage disclosure of the generation mix/environmental attributes to electricity consumers on retail bills and promotional material	Alberta	Increase awareness	

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Barriers to Interprovincial Trade and Transmission	Support consultations and analysis to i) identify barriers to regional trade and transmission, and ii) develop policy/ regulatory options, consistent with competitive markets, to reduce barriers	Joint Intergovernmental Federal	Reduce GHG Emissions Improve access to cost effective low-emission sources of electricity	Pending policy and funding decision
Electric Transmission Infrastructure Study	Assess potential for new inter-provincial transmission infrastructure under differing sets of fossil fuel/hydraulic relative prices to reduce GHG emissions as part of Canada's international obligation. Identify and quantify the economic impacts on regions which are candidates for greater interconnected capacity. Identify, quantify and value additional benefits and/or negative impacts of interconnections. Identify/ determine magnitude of barriers to achieve interconnections. Identify/ describe options for overcoming barriers Estimated cost: $50,000-$75,000	Co-operative Inter-jurisdictional study management team: Manitoba / British Columbia / Ontario / Quebec / Newfoundland / Federal Manitoba	Potentially significant GHG reduction tool	2000-2001
Government Procurement	Expand opportunities for emerging renewable and non-GHG-emitting sources of electricity by purchasing electricity from these sources for federal facilities and displacing purchases from high-carbon sources Cooperate with provinces, green power marketers, and consumers to encourage further market development and economies of scale (See also Governments Leading by Example actions)	Joint intergovernmental Federal / Provinces / Territories	Reduce GHG emissions Government leadership facilitates other sales	Pilots under development Pending policy and funding decisions
Voluntary Market Development	Support voluntary market development for emerging, non-GHG emitting technologies by expanding scope of NRCan outreach initiatives (Canadian Industry Program for Energy Conservation, Energy Innovators), and structure government procurement to encourage development voluntary private market	Joint Public / Private Federal	Reduce GHG emissions	Pending policy and funding decision

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Green Energy and Renewables	Encourage availability of green power and increase use of renewable energy sources	Joint Public / Private Nova Scotia	Reduce GHG emissions, Stimulate investment in green power	
	Expansion of generation capacity at Atlantic Wind Test Site (AWTS)	Prince Edward Island / Federal	Reduce GHG emissions	2000-2002
	Promote and participate in development of renewable energy sources	Joint Public / Private Newfoundland	Reduce GHG and other emissions Health risks reduced Other environmental impacts	Pending policy and funding decisions
Develop Non-GHG Technologies	Develop and demonstrate non-GHG technologies	Joint Public / Private Newfoundland	Reduce GHG and other emissions	Pending policy and funding decisions
Cogeneration	Consider a joint cogeneration project with a customer to use bark along with heavy oil for electricity generation. This would displace oil at a thermal generating station with a net reduction in GHG	Joint Public / Private Newfoundland	Reduce GHG and other emissions	Pending policy and funding decisions
Power Sales Incentive Program	Encourage the use of surplus renewable electricity to displace fossil fuels used for space and water heating	Yukon / Yukon Energy Corporation	Reduce fossil fuel consumption Financial savings for building owners Increase sales for utility	Under development for 2001
Access natural gas for electrical generation		Joint Prince Edward Island / Federal / Private	CO_2	2000-2002
Objective c: To incent improved energy-use and energy-management practices of local distribution compani				
GHG Monitoring and Reporting pilot	A pilot program, involving companies from the electricity and petrochemical sectors, for reporting GHG emissions. Pilot participants will help work out procedural details related to reporting of direct GHG emissions from provincial licensed facilities	British Columbia	Increase awareness Reductions in GHG emissions	2000-2002

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective d: To facilitate efficient energy-use behaviour of electrical consumers and the increased choice of alternative low emitting energy sources				
Consumer Information	Develop common or compatible methods for retailers to report to consumers their electricity sources and environmental attributes; consistent with domestic and international trade	Joint Inter-governmental Federal	Reduce GHG Emissions Increase demand for low emission sources	Pending policy and funding decision
	Encourage common methodology related to private sector disclosure of the generation mix / environmental attributes to electricity consumers on retail bills and promotional material	Private sector Alberta	Improve awareness / consumer change	2000-2002
	Demand-side Management (DSM) Investigate the use of DSM in rural, isolated areas to moderate electricity use by customers. Since electricity is generated at diesel plants in these areas, DSM would reduce GHG emission	Public Newfoundland	Reduce GHG and other emissions	Pending policy and funding decisions
GHG Monitoring and Reporting Pilot	A pilot program involving companies from the electricity and petrochemical sectors which will look at the establishment of a GHG monitoring and reporting program that can be expanded to other sectors	Industry / Alberta		

d) Forestry (sinks)

Canada has approximately 417 million hectares of forest. Climate change represents a significant risk to Canadian forests due to forecast changes in growing conditions. At the same time, however, carbon sequestered by Canadian forests could provide an important opportunity to reduce national emissions through afforestation, reforestation, and forest management. Coordination between land-owners and governments, and increased research and capacity development is key to taking advantage of opportunities in these areas; however, clear international rules on afforestation, deforestation, reforestation and forest management are still under negotiation. Notwithstanding the uncertainty, there is considerable interest, across the economy, in enhancing forest sinks. Emissions reduction opportunities related to forest industry operations, such as pulp and paper and lumber are addressed in the industry section.

Objectives and Supporting Actions

a) **To position Canada to seize opportunities through the use of the sink provisions in the Kyoto Protocol**

b) **To increase the understanding of the potential role of afforestation for carbon sequestration** to allow more informed decisions on implementation of large-scale afforestation efforts

c) **To promote awareness and understanding of the potential role of reforestation and forest management for carbon sequestration**

d) **To increase the understanding of causes and locations of deforestation, develop reporting capacity and mitigation measures**

e) **To increase research capacity and measurement infrastructure** to improve the understanding of the potential role of forest sinks under the Kyoto Protocol and the capability to report on sink activities

Results Anticipated

The First National Business Plan will focus predominantly on carbon sequestration activities that can be used to offset GHG emissions. Actions, both approved and under consideration, will enhance the understanding of Canada's forest sinks potential and explore the roles of afforestation and enhanced silviculture activities as climate change mitigation strategies.

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To position Canada to seize opportunities through the use of the sink provisions in the Kyoto Protocol				
Objective b: To increase the understanding of the potential role of the afforestation for carbon sequestration				
SaskPower – SERM Carbon Offset Agreement	Planting 5 million trees and creating carbon sink (Planting and management costs)	Saskatchewan	Sequestration of 6 million tonnes of carbon	2000-2003
Objective c: To promote awareness and understanding of the potential of reforestation and forest management for carbon sequestration				
New Forestry Regulation and Requirements to Increase level of Silviculture	Increase forest growth through prompt regeneration; compel wood buyers to finance silviculture on lands of origin. Wood buyers required to finance silviculture	Nova Scotia	Increase carbon storage in forests	
Forestry Projects to Improve Knowledge of Carbon Sinks	Intensification of forest sample plots to measure growing stock and growth rates $225,000/yr for five years	Nova Scotia	Increase carbon storage in forests	Implemented 5 years

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Planting Hedgerows and Shelterbelts	Financial and technical assistance to mitigate soil erosion by wind and to sequester carbon	Prince Edward Island	Reduce nutrient runoff into waterways (e.g. buffer strips)	2000-2003
Objective d: To increase the understanding of causes and locations of deforestation, develop reporting capacity and mitigation measures				
Objective e: To increase research capacity and measurement infrastructure				

Actions Under Consideration (Policy/Budget Approval Needed)

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To position Canada to seize opportunities through the use the sink provisions in the Kyoto Protocol				
Planting Shelterbelts	Expanded programs for shelterbelts, consistent with rules to be negotiated under Kyoto Protocol and riparian buffer establishment; Focus will be on prairie cropland; provincial co-operation and cost-sharing will be sought	Federal	Reduce net GHG emissions, soil erosion and nutrient runoff into waterways	2001-2005
Objective b: To increase the understanding of the potential role of the afforestation for carbon sequestration				
Afforestation Initiative – Regional Pilot	A two-phase development / implementation program to afforest privately owned marginal agricultural land, to be developed as a public / private partnership and in cooperation with the federal government	Public / Private British Columbia	Study sink potential of afforested lands	
Afforestation Program Development Initiative	Planning and designing afforestation program in Canada, including cost-shared pilots with provinces/territories. This is a preparatory action to carry out program development work that may lead to a larger scale Phase Two national afforestation program	Joint Federal / Provincial / Territorial / Private Federal	Carbon sequestration under Phase One is negligible	Pending policy and funding decisions The phase one afforestation development 2001-2004
Afforestation and Reforestation Initiative	Under an afforestation component of its private land silviculture program, New Brunswick expects to plant 500 ha. of abandoned privately-owned farmland per year With respect to Crown land, land having less than 60 percent regeneration stocking after harvesting will be planted This Crown land reforestation initiative will see about 10,000 ha planted each year	New Brunswick	GHG sequestration	2000+

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Agroforestry Sector Development	Encourage sustainable use of existing timber stands; new stands of fast growing trees; shelterbelts on cultivated land	Joint Saskatchewan / Federal / Private	Establishment of carbon sinks Increase crop productivity through improved moisture Improved wildlife habitat	2000-2003
Objective c: To promote awareness and understanding of the potential of reforestation and forest management for carbon sequestration				
Build Awareness to Determine Best Forest Management Practices in Relation to Sinks	Work with private landowners (especially those with agricultural activities) to ensure that they have sufficient knowledge, from both an afforestation and an agricultural activity perspective, to make informed decisions about which programs to undertake. This type of program would be built in partnership with those in the sector with appropriate experience	Alberta	Increase knowledge	2000-2002
Objective d: To increase the understanding of causes and locations of deforestation, develop reporting capacity and mitigation measures – SEE ACTIONS UNDER INVESTING IN KNOWLEDGE/BUILDING THE FOUNDATION THEME				
Objective e: To increase research capacity and measurement infrastructure – SEE ACTIONS UNDER INVESTING IN KNOWLEDGE/BUILDING THE FOUNDATION THEME				

e) Industry

Canada's economy is the most open of any G-7 country. Trade in goods and services comprise about 75 percent of GDP. About 40 percent of our goods and services are exported, more than three times the rate of the U.S. and about 2.5 times the G-7 average. Indeed, Canada's exports have increased 8.3 percent per year since 1990 and by about 20 percent in the past year alone.

An outward-oriented economy like Canada's must be sensitive to the demands of the market and to the actions of its competitors, including those from both developed and lesser-developed countries. This is particularly so for resource-based goods. Resource-based goods comprise about 40 percent of Canada's exports, contributing substantially to the wealth and employment of Canadians, particularly in rural Canada. However, these goods require significant energy to produce. Unless there is a substantial drop in international demand for resource-based goods (a scenario that is not envisioned), Canada's export orientation means that it will be challenging to maintain and enhance our standard of living while reducing our absolute level of GHG emissions in those sectors.

Industry currently accounts for approximately 33 percent of Canada's GHG emissions. GHG emissions increased by approximately 12 percent between 1990 and 1998, while output increased about 13 percent. However, there is considerable variation in GHG performance. Emissions intensity has decreased in almost all sectors. Emissions from the manufacturing sector have remained flat since 1980 while output has grown by over 50 percent. In contrast, despite of their improvements, emissions associated with upstream oil and gas development and transmission have grown substantially, fuelled in large part by a significant increase in natural gas exports. Emissions from this industry sector are expected to increase substantially during the next decade as new oil sands investments come onstream.

In most industries, energy costs comprise less than 2-3 percent of total costs. Some sectors, like agriculture and agri-food, are increasingly engaged in value-added production, with associated increases in energy use. As a consequence, investments to improve energy efficiency are often part of a larger investment decision to augment or change production capacity. In more energy intensive industries, such as pulp and paper, steel and petroleum refining, energy savings have much more weight in the decision-making process. In the mining and metals sector, important energy efficiency gains and GHG emissions have already been achieved. Enhanced voluntary actions and measures targeted at increasing recycling rates and the use of less GHG intensive materials will provide further opportunities for emissions reductions. In the upstream oil and gas sector, rapid growth in both production and exports are anticipated, requiring special attention to emissions reduction opportunities. Additional Phase One measures are proposed for these sectors, and are addressed separately in the following sub sections E) i Minerals and Metals and E) ii Oil and Gas.

Particularly noteworthy is that new energy efficiency investments during the past decade occurred during a period of declining real energy prices. When world oil price shocks raised awareness about energy efficiency options, programs like Natural Resources Canada's Canadian Industry Program for Energy Conservation (CIPEC) sustained that message. Further, the discipline imposed by the globalisation of trade also reinforced industry's preoccupation with reducing their costs of production, including their energy costs. It is also important to realize that investment decisions on new capital equipment are taken with a long-term view extending over the useful life span of equipment. As a result, recent investments in capital equipment may not be upgraded within the relatively short period contemplated by the Kyoto Protocol.

An overarching objective for the industrial sector is to maintain or enhance Canada's competitive position and its attractiveness as a location for investment. As a trading nation, much of Canada's wealth is built on the production and export of resources and energy-intensive goods. Industry faces increasing competitive pressures and thus seeks parity with competitors and unfettered access to traditional/developing markets and market mechanisms.

The objectives and supporting actions that follow aim to enhance existing voluntary efforts by industry and encourage innovation and market-based solutions. They focus primarily on harvesting near-term, win-win opportunities, while setting the stage for subsequent actions. These proposed Phase One measures help to remove some of the barriers encountered by companies in implementing energy efficiency and GHG reduction initiatives.

Objectives and Supporting Actions

a) **To raise awareness about climate change and identify cost-effective opportunities to enhance company competitiveness and GHG reduction performance**

b) **To encourage investments in more energy-efficient/low/non-GHG emitting technologies and processes**, and recognizing regional differences, eliminate regulatory barriers and promote the use of cogeneration, fuel switching and alternative fuels

c) **To promote further voluntary GHG emission reduction programs** through a framework that encourages industry participation in setting goals, recognizes efforts publicly, and facilitates the availability of capital for efficiency investments that reduce GHG emissions

Results Anticipated

For the First National Business Plan, actions approved or under consideration will begin to generate GHG emissions reductions, provide improved energy efficiency, environmental co-benefits and enhance knowledge within the following industry sub-sectors:

- agri-food processing;
- chemicals;
- forest products;
- petroleum refining;
- small and medium enterprises; and
- other manufacturing.

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To raise awareness about climate change and identify cost-effective opportunities to enhance company competitiveness and GHG reduction performance				
Integration of Climate Change in Environmental Assessments	Ensure integration of Climate Change considerations during the Environmental Assessment Process for all new projects	Joint Public / Private Northwest Territories	GHG and other emissions affected Other environmental impacts	2000-2001
Energy and GHG Emissions Reductions Pilot Project	Energy audit pilot projects ; savings in energy costs and GHG emissions reduction Develop and complete 18 to 20 pilot projects	Federal / Alberta / Alberta Food Processors Association	Enhance awareness of GHG reducing management practices Reduce GHG emissions and energy costs	2000-2003

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective b: To encouraging investments in more energy-efficient/low/non-GHG emitting technologies and processes				
Encourage use of Natural Gas in Nova Scotia	Maintain a regulatory framework that encourages the use of natural gas and ensure that industry locates where appropriate infrastructure is already in place (referenced in Oil and Gas section)	Nova Scotia	Reduce GHG emissions	2001-2004
Control of HFCs and PFCs	Amendments to Alberta ozone-depleting substances regulation to control releases of HFCs, PFCs and HCFCs	Alberta	Sound practices for handling of ozone-depleting substances Reduce GHG emissions (PFCs)	2001-2002 2002-2003
Objective c: To promote further voluntary GHG emission reduction programs				
Support for Engaging Small and Medium-Sized Enterprises (SMEs)	Engage small and medium enterprises to take action on climate change in Alberta. $15K (Alberta Government) $174K (Total)	Pembina Institute Alberta	Improved energy efficiency Improve competitiveness of Alberta companies	2000-2001 2001-2002
Model Voluntary Agreements (covenants)	Model voluntary emission reduction agreements with binding targets	Federal / Provincial / Territorial / Industry		Ongoing

Actions Under Consideration (Policy/Budget Approval Needed)

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To raise awareness about climate change and identify cost-effective opportunities to enhance company competitiveness and GHG reduction performance				
Climate Change and GHG Research for Processors	Position Alberta Agri-Food processors to take advantage of credit for early action and emission credit trading. Develop the Alberta food processors association's internal capabilities and procedures for ongoing trading verification, registration and trading	Alberta / Federal / Universities Applied Research Organizations / Alberta Environmentally Sustainable Agriculture Council (AESA) / Industry	Reduce GHG emissions from food processing	2001-2003
Agricultural Food Processing Practices	Manage energy usage and invest in energy efficiency improvements For agricultural food processors in Alberta to provide significant savings in energy costs and reduce GHG emissions	Alberta / Federal / Industry / Alberta Food Processors Association / Alberta Climate Change Central	Energy Audit Pilot Projects for 18-40 companies Reduce energy costs and GHG emissions Improve awareness to competitiveness	2000-2003

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
GHG Mitigation Guidelines Under Provincial Environmental Assessment Process	Initiation of a consultation process to review the potential of establishing guidelines for GHG mitigation plans for projects reviewed under the provincial Environmental Assessment Process	British Columbia	GHG considerations incorporated in existing environmental assessment process	
GHG Guidelines for Pollution Prevention (P2) Planning	Incorporate climate change considerations directly into the Province's environmental stewardship initiative. Develop guidelines for GHG mitigation to be included in provincial guidelines for pollution prevention planning	British Columbia	GHG management objectives incorporated into provincial pollution prevention planning	
Develop Basic Information	Strengthen baseline information	Provincial / Federal Newfoundland	More thorough understanding of the sectors of concern within the province	To be developed
Support for CO_2 Capture-and-Storage Via Enhanced Oil Recovery	To validate costs and identify and address regulatory barriers to the capture-and-storage of CO_2	Federal	Reduce GHG emissions	2000-2004 2000-2005
Increase Methane Capture and Utilization	At Agri-Food Processing Plants	Prince Edward Island / Private	CH_4	2002-2003
Stewardship Incentive Program	Recognize producers / processors for both food and environmental stewardship benefits to society including GHG mitigation	Alberta		
Public Education	Educate businesses and the public about climate change	Newfoundland / Municipalities / Industry Associations	Increase awareness of small and medium businesses with resultant "buy in" to GHG reduction initiatives	To be developed
Support Research and Extension for Alberta Processors	Ensure policies facilitate research and extension that will give processors the tools they need to implement cost effective technologies to reduce GHG emissions	**Alberta**		**2000-2004**

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective b: To encouraging investments in more energy-efficient/low/non-GHG emitting technologies and processes				
Natural Gas	Natural gas is being introduced in New Brunswick and will displace oil and coal. It is the intent of the New Brunswick to pursue natural gas access throughout the entire province through the development of lateral pipelines and expansion of distributions systems	New Brunswick	Reduce GHG emissions	2000+
Enhanced Renewable Energy Deployment Initiative (REDI)	Support industry, infrastructure development, marketing (referenced in Oil and Gas section)	Federal	Reduce GHG emissions	2001-2005
Renewable Energy Program	Provide policy and technical support for small renewables and fund demonstration projects and pilots	British Columbia	Reduce GHG emissions	
Support Reduction Initiatives from Enterprises	Support Small and Medium enterprises in GHG reductions	Provincial / Federal / Private Newfoundland	Reduce GHG emissions	To be developed
Support for Research	Support for research, development and demonstration of low emissions and productivity enhancing technologies	Provincial / Federal Newfoundland	Eventual commercial use and sale of Canadian GHG reduction technologies providing environmental and economic benefits	To be developed
Objective c: To promote further voluntary GHG emission reduction programs				
Alberta Policy Analysis for Processors	Expands policy analysis to aid research and extension on GHG mitigation in the value-added processing sector (similar initiative for Producers in Agriculture section)	Alberta / Alberta Food Processors Association / Alberta Environmentally Sustainable Agriculture Council (AESA)	Provide support for further energy efficiency / GHG emission reduction audits	2000-2003
Education and Awareness	Education and Awareness for Alberta Food Processors Raise awareness and understanding of how adopting GHG reducing management practices now can save money in the future	Alberta/ Federal/ Industry Alberta Environmentally Sustainable Agriculture Council (AESA)	Enhance awareness	2000-2003

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
	Encourage GHG supply change initiatives (e.g. purchase of GHG friendly products) via existing programs and services, e.g. Success Work online service	Provincial / Federal / Private Newfoundland	Reduce GHG emissions	To be developed
Energy Efficiency – Audits and Incentives **(CIPEC, etc.)**	Canadian Industry Program for Energy Conservation (CIPEC) - Sector-level, industrial energy efficiency outreach and advocacy program that promotes the establishment, implementation, tracking and reporting of energy efficiency improvement targets in sectors/sub-sectors	Federal		2000-2001
	Championing CIPEC – Energy Innovators in Alberta Work with federal partners and industrial associations to champion CIPEC and Energy Innovators Programs within Alberta	Alberta	Cost-saving energy efficiency / GHG actions	
	Industrial energy efficiency - audits and incentives – Develop an outreach program and a workable financing/insurance mechanism to facilitate cost-effective energy efficiency improvements in the industrial sector, likely with an initial focus on the pulp and paper sector. Initiatives considered include pilot projects with industry, facilitating energy performance contracting and providing incentives through existing regulation/fees	Public / Private British Columbia	Industrial energy efficiency improvements	
Operation & expansion of Charlottetown district heating		Private Prince Edward Island	CO_2	2000 –2002

e) i Minerals and Metals

In Canada, there are over 350,000 persons employed in the minerals and metals sector. The sector's output of base and precious metals, primary iron and steel, aluminium, magnesium, secondary metal products, lime, cement and concrete provides raw materials to every economic sector in Canada and supplies important export markets. The sectors' 1,900 facilities contribute approximately $27 billion, or 4.3 percent, of Canada's total GDP. Total direct GHG emissions in 1990 were 56 megatonnes of CO_2 equivalent. This was one-third of all industrial GHG emissions and 9 percent of Canada's total.

To remain cost competitive in the global marketplace, the sector has continually invested in new technologies to enhance its energy efficiency as well as its overall environmental performance. Despite significantly increased production throughout the 1990s, preliminary estimates for 2000 are that the sector increased its GHG emissions by only 0.7 megatonnes of CO_2 equivalent, or about 2 percent of 1990 emissions. By 2010, under a business-as-usual scenario involving increased production levels and existing industry commitments, total direct greenhouse emissions are projected to reach 58 megatonnes, only 3 percent higher than 1990 levels. Analyses done to date for the National Climate Change Process indicate that the sector as a whole, with modest support from governments, could reduce 2010 emissions close to 55 megatonnes.

Objectives and Supporting Actions

a) **To build on the track record and positive future commitments by the sector**. With relatively modest actions the sector can continue to make important strides at reducing GHG emissions

b) **To encourage indirect approaches to reducing GHG emissions** (e.g., by increased recycling of steel, aluminium and magnesium, and by increased use of concrete in roads)

Results Anticipated

Actions approved and under consideration by the minerals and metals sector for the First National Business Plan will make direct reductions to greenhouse emissions and provide environmental co-benefits.

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To build on the track record and positive future commitments by the sector				
Objective b : To encourage indirect approaches to reducing GHG emissions				

Actions Under Consideration (Policy/Budget Approval Needed)

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To build on the track record and positive future commitments by the sector				
Studies for GHG Reductions Potential and Monitoring in MM Sector	Includes administrative / infrastructure / concept development	Federal		Work with industry to define

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective b: To encourage indirect approaches to reducing GHG emissions				
Promote Enhanced Recycling	Development of improved recycling technology (steel, aluminium, Mg) Some behaviour based improvements immediately, some technologies later	Federal	Reduce GHG Emissions	2001
Supplementary Cementing Materials	Increase usage of supplementary cementing materials by construction and cement and concrete industries	Federal	Reduce GHG Emissions	2001
Increased Use of Concrete in Roads	Information program only. Repayable funds required to offset up-front costs of concrete	Federal	Reduce GHG Emissions	2001

e) ii Oil and Gas

Canada's upstream oil and gas sector is a $26 billion industry accounting for 23 percent of industrial GHG emissions arising from activities such as production, transmission, processing, and distribution. From 1990 to 1998, Canadian crude oil production increased by 25 percent. It is expected to increase a further 25 percent between 1998 and 2010. Between 1990 and 1998, Canadian natural gas production increased by 66 percent. Increased capacities have contributed to reduce global emissions by displacing more emissions intensity energy sources in the US. It is expected to increase another 45 percent between 1998 and 2010. Given the forecast increases in production, total upstream oil and gas GHG emissions are expected to rise, despite a decline in average emissions intensity as companies improve production technology (e.g., between 1990 and 1998, energy intensity improved by 24 percent in the oil sands sector).

The upstream oil and natural gas sector constitutes one of the cornerstones of the Climate Change Voluntary Challenge and Registry Inc. (VCR Inc.). Companies from this sector were founding members of this company-level voluntary initiative and have reported on a number of win/win accomplishments in terms of energy efficiency improvement and emission reductions. The proposed measures in the First National Business Plan build upon these accomplishments. Actions specific to the sector are designed to address non-energy related emissions such as fugitive emissions and the capture and storage of CO_2 (e.g., through enhanced oil recovery).

Objectives and Supporting Actions

a) **To broaden government/private sector collaboration in research, demonstration and commercialization of carbon dioxide (capture and storage) management**

b) **Through continuous technology and operational improvements, to continue to reduce emissions intensity and exceed competitors' emission intensity benchmark**

c) To broaden voluntary reductions and offsets through codes of best practice and participation in government/private sector programs

Results Anticipated

For the First National Business Plan, a primary anticipated outcome is the development of a Canadian carbon management strategy. Other actions approved or proposed for the upstream oil and gas sector will improve greenhouse emissions intensity, result in direct reductions and further the development of carbon dioxide capture and storage technologies.

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To broaden government/private sector collaboration in research, demonstration and commercialization of carbon dioxide (capture and storage) management				
Objective b: Through continuous technology and operational improvements, to continue to reduce emissions intensity and exceed competitors' emission intensity benchmark				
Energy Efficiency Management, Audits and Incentives (CIPEC, etc.)	Canadian Industry Program for Energy Conservation (CIPEC) – Encourage trade associations to participation in CIPEC & public commitment to GHG reduction targets	Federal / Provincial / Territorial	Reduce GHG emissions	Ongoing
Oil and Gas Commission Environmental Fund	To explore the feasibility of eliminating emissions (sulphur dioxide and GHG) form flaring and fugitive emissions through development of best management practices and the development of new technology $400K	British Columbia	Reduce direct GHG and other emissions	2001-2002
Reduce Flaring and Venting in the Oil and Gas Sector	The Clean Air Strategic Alliance (CASA) board of directors has approved a multi-stakeholder working group to review flaring practices in Alberta and recommend an Alberta venting management framework	CASA to provide recommendations to Alberta Government for implementation	Improvements in flaring management Reductions in volumes of solution gas vented into the atmosphere	Recommendations to Government in 2001
Renewable Energy	Promote Renewable Energy Deployment Program to Upstream Oil and Gas Sector	Federal	Emissions reduction in CO_2	2000–2004

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
	Renewable Energy Deployment Incentive Program (REDI) - More pro-actively market incentive for renewable energy projects to sector. Support industry, infrastructure development, marketing (referenced in general Industry section)	Federal; CIPEC, Canadian Association of Petroleum Producers, Petroleum Technology Alliance	Emissions Reduction in CO_2	2000–2004
Objective c: To broaden voluntary reductions and offsets through codes of best practice and participation in government/private sector programs				
Maintain Regulatory Framework to Encourage Use of Natural Gas	Encourage use of natural gas in Nova Scotia (referenced in general Industry section)	Nova Scotia	Reduce GHG emissions	

Actions Under Consideration (Policy/Budget Approval Needed)

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To broaden government/private sector collaboration in research, demonstration and commercialization of carbon dioxide (capture and storage) management				
Understand CO_2 Capture via Enhanced Oil Recovery (EOR)	Gain fuller understanding of applicability of technology to CO_2 storage; examine regulatory and fiscal barriers	Federal / Alberta / Saskatchewan		2000-2001
Develop, Support and Provide Leadership for Optimal CO_2 Capture and Storage	Support the expanded use of CO_2 capture and storage in Canada, beginning with CO_2-based enhanced oil recovery (CO_2EOR)	Federal		
Advance CO_2 Capture and Storage Technologies	Support for Deployment of Current CO_2 Storage Technologies - Provide a favourable investment opportunity for the private sector to adopt climate-friendly business practices (Reduced royalty / sales tax exemptions)	Joint Saskatchewan / Federal / Other Provinces / Private	Reduce carbon dioxide emissions Increase employment Increase investment Increase oil production	2001-2003

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective b: Through continuous technology and operational improvements, to continue to reduce emissions intensity and exceed competitors' emission intensity benchmark				
Energy Innovators Initiative and CIPEC (Canadian Industry Program for Energy Conservation)	Canadian Industry Program for Energy Conservation (CIPEC) – Encourage trade associations to participation in CIPEC & public commitment to GHG reduction targets: Upstream oil and gas sectors join Industrial Energy Innovators Initiative; Enhancing Platforms for Voluntary Actions	Federal	Information / Advice / Benchmarking	2000-2004
	Recruitment of sector companies to Industrial Energy Innovators - Address non-financial barriers to energy efficiency; awareness building, energy efficiency audits, Supply Chain Climate Change Pilot	Federal / Industrial / Provincial / Territorial		
	Extend reach of Canadian Industry Program for Energy Conservation to Upstream Oil and Gas Sector; Enhancing Platform for Voluntary Actions	Federal	Information / Advice / Benchmarking	2000-2004
Objective c: To broaden voluntary reductions and offsets through codes of best practice and participation in government/private sector programs				
Stimulate Energy Efficiency and GHG Fugitive Emissions Abatement	Examine existing fiscal and regulatory tools and instruments	Federal possibly other oil-producing provinces		

f) Municipalities

Municipalities, including both urban and rural communities, have direct control over approximately 7 percent of Canada's GHG emissions through their own operations (e.g. waste management, landfills, buildings and facilities, street lighting, vehicle fleets). They also influence over half of Canadian emissions through their roles in the community at large. Over the last 10 years, municipalities have demonstrated that they are effective delivery agents, both directly and indirectly, of programs to reduce GHG emissions and adapt to climate change, in particular with other orders of governments. In addition, provincial/territorial, national and international networks and associations are facilitating municipal information-sharing, the development of expertise and the sharing of best practices.

The approach to the municipalities sector is to reach, teach and equip municipalities to partner with federal, provincial and territorial governments in addressing opportunities within their own operations and their communities. The sector strategy will aim to assist with the engagement and equipment of both rural and urban communities.

Municipalities are a place where significant GHG reduction opportunities can be realized while at the same creating multiple local co-benefits (e.g. clean air, job creation) for Canadians. Effort to support municipal action will result in GHG reductions in the short term, and lay a foundation for future measures. Many actions that will affect municipalities are included in other sectors (e.g. Transportation, Building).

Objective and Supporting Actions

a) **To build the capacity for municipal governments and communities to address climate change and undertake both mitigation and adaptation responses**

b) **To reduce GHG emission from municipal operations**

c) **To engage municipal governments and communities in the strategy of enhancing awareness and understanding, as well as encouraging them to take action**

Results Achieved

- A substantial increase to the number of municipalities/communities engaged in GHG reduction, both in their own operations and in the community at large; and
- Greatly enhanced municipality and community participation in engagement and outreach.

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To build the capacity for municipal governments and communities to address climate change				
Climate Change Action Fund - CCAF-PEO (Public Education and Outreach)	Resources provided for cost-shared projects, some directed at municipalities Assist municipalities with program delivery, and assist national / regional organizations assisting municipal government (link with Enhancing Awareness and Understanding section)	Federal		2000-2002
Objective b: To reduce GHG emissions from municipal operations				
NRCan/Federation of Canadian Municipalities (FCM) Municipal Building Retrofit Program	A program to advance the adoption of energy efficiency in the municipal sector Strategic plan for implementation Marketing, recruitment, situation audits, etc. Education, tools, training for municipal officials to plan and act on opportunities $1.5 million provided in 1998 federal budget	Federation of Canadian Municipalities Federal	Strategic plan for implementation, marketing, recruitment	2000-2001 Results available for use in 2000-2001 and beyond

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Infrastructure Investment and Funding (GMEF/GMIF, etc.)	The Green Municipal Enabling Fund and the Green Municipal Investment Fund (GMEF/GMIF) Energy efficiency projects for municipally owned and operated facilities. Allow for projects in waste management, transportation systems and renewable energy technologies. GMEF pays for 50 percent of feasibility studies GMIF provides loans for up to 25 percent of capital projects 25$ million in '00 federal budget	Federation of Canadian Municipalities Federal	Reduce GHG emissions	Implemented program Ongoing
	New National Infrastructure Program Tripartite funding for projects (1/3, 1/3, 1/3) for a variety of GHG reduction and other projects; likely a large focus on water and wastewater projects $100 million provided in 2000 federal budget	Intergovernmental Federal	Reduce GHG emissions	2000-2002
Energv Conservation Program	Provide funding assistance to carry out energy saving renovations	Northwest Territories	GHG and other emissions affected Other environmental and social impacts	2000-2003
Solid Waste Management Strategy	Solid waste management strategy to divert 50 percent of all wastes and 100 percent of organic material	Nova Scotia	Reduce GHG emissions, particularly CH_4	
Landfill Methane Utilization	Methane gas from Edmonton's Clover Bar Landfill is recovered and used to produce electricity at EPCOR's nearby generating station	EPCOR / City of Edmonton	Reduce GHG emissions	Ongoing

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective c: To engage municipal governments and communities in the strategy of enhancing awareness and understanding, as well as encouraging them to take action				
Expansion of Natural Gas Utilities to Alberta Metis Settlements	Support the further development of natural gas infrastructure in the three Metis settlements that until now were without gas utility service $3 million (Alberta Government)	Alberta	Improve access to natural gas distribution system within remote Alberta communities Reduce reliance upon more carbon intensive heating fuels	2000-2002

Actions Under Consideration (Policy/Budget Approval Needed)

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To build the capacity for municipal governments and communities to address climate change				
Building Awareness with Municipalities	Awareness sessions with respect to municipal actions that could be conducted through an existing Training Partnership	Newfoundland	Increase awareness	Year 1
Capacity Building for Alberta Municipalities	Work with Alberta's municipal associations, municipalities, key provincial departments and the Federation of Canadian Municipalities to engage Alberta municipal leaders in developing municipalities capacities to reduce GHG emissions	Alberta	Increase awareness	
Objective b : To reduce GHG emissions from municipal operations				
Solid Waste Management Initiatives	Conduct studies and explore options for replacing existing sites and incinerators that are harmful to the environment	Newfoundland	Reduce GHG emissions	Year 1 to year 3
Landfill Gas Management and Strategies	Update regulations and management criteria for landfills, including requirements for collection and management of landfill gas. Support the development of local government proposals to utilize landfill gas	British Columbia / Regional / Local Governments	Reduce GHG emissions	
Energy Audits for Municipal Buildings	Develop the capacity to assist Alberta municipalities in reducing GHG emissions associated with their operations	Alberta	Reduce GHG emissions	

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective c: To engage municipal governments and communities in the strategy of enhancing awareness and understanding, as well as encouraging them to take action				
Community Energy Management	Coordinate community energy management initiatives with existing outside agencies and green communities programs Provide financial assistance to these agencies to deliver outreach and project implementation to municipalities and residences across the province. Target municipal land use and transportation planning, residential design, home energy efficiency, personal transportation choices and other areas	British Columbia / Regional / Local Governments	Reduce GHG emissions	
Work with Union of Nova Scotia Municipalities to Increase Participation in Climate Change	Encourage municipal action aimed at reducing GHG emissions in key areas such as buildings, transportation and land-use planning. Includes funds for building audits, low-cost loans for energy assessment, retrofits, and other climate-change related activities	Nova Scotia	Reduce GHG emissions Improve awareness of climate change	
Support Northern and Aboriginal Communities	Promote energy efficiency and use of renewables; develops adaptation strategies	Federal / Territories	Reduce GHG emissions Lessen impacts of Climate Change	2001-2002

g) Transportation

Transportation is a large and diverse sector accounting for approximately 25 percent of Canada's GHG emissions. The sector comprises smaller, mobile emissions sources and includes urban, inter-urban and rural transportation and across a variety of transportation modes and a diversity of regional systems. Transportation growth has outstripped annual efficiency gains and environmental improvement; emissions are growing rapidly and are expected to be one third above 1990 levels by 2010. Most of the rapid growth is in aviation, trucking and off-road uses.

Climate change is also important to this sector because of the potential impacts and adaptive requirements it may impose on transportation infrastructure. In northern Canada, for example, shortening of ice road seasons and changes to permafrost depth require adaptation in road choice and construction design.

Continuous modernization of the transportation system to ensure efficient movement of people and goods is essential to the Canada's competitiveness, trade and quality of life. Because changes in transportation policy have direct impacts on individual Canadians, including behavioural changes, enhancing public awareness and support is required. Moreover, similar to the broad climate change issue, each order of government has jurisdiction over different aspects of the system; policy coordination is important. At the same time, flexibility is required to address regional variations and unique urban/rural challenges.

Urban transportation bridges the municipality and transportation sectors. While it is principally addressed under transportation, it also has links to municipal planning, communications and related actions. In addition it requires coordination with actions to address other air quality issues and other urban issues of congestion and safety. By contrast, rural communities have fewer transportation options.

Emerging technologies to improve transportation components — infrastructure, vehicles, fuels and system — intermodal integration — are critical components of any transportation-related strategy. However, technology change will have a longer term impact. Shorter term reductions will largely be driven by behavioural changes. The overall approach must include behavioural changes, infrastructure modifications and technology development.

Objectives and Supporting Actions

a) **To encourage behavioural change through** increased public awareness, promotion of changes in driving behaviour, reduced use of cars in urban areas, and the deployment of voluntary commercial best practices

b) **To increase use of more efficient and integrated transport systems** to reduce congestion, improve traffic flow, encourage the efficient movement of goods and increase the use of public transit

c) **To promote increased fuel efficiency and use of less carbon-intensive fuels** through improved vehicle technologies, fuel quality, and support for the production and distribution of alternative fuels

d) **To improve the understanding of how climate change could affect Canada's transportation systems**, particularly in the North, coastal regions, marine, and shipping on the Great Lakes and St-Lawrence

Results Anticipated

The actions underway and proposed will result in direct reductions of GHG emissions through:

- expansions to public transportation infrastructure;
- development of intelligent transportation systems;
- environmental tax shifting and other fiscal initiatives;
- expanded studies of fuels, fuel efficiency and energy management within the sector; and
- enhanced public awareness of transportation alternatives.

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To encourage behavioural changes				
Regional Growth and Transportation Demand Management (TDM) Strategies	The Province is providing technical support to local and regional governments in the main urban growth areas (Lower Mainland, Okanagan Valley and Greater Victoria) to help develop regional growth and transportation demand management strategies, aimed at designing settlement patterns and transportation modes that decrease vehicle use and shorten travel distances	British Columbia	Change settlement patterns and transportation modes	2000-2001
Increase Awareness of Transportation Options and Encourage Behavioural Change	Increase awareness of transportation options and encourage behaviour change to less GHG emitting options. $150,000	Joint Public / Private Nova Scotia	Reduce GHG emissions. Create awareness of links between climate change, transportation energy use	
Moving on Sustainable Transportation (MOST)	Provide support for innovative projects, (including research, demonstrations and awareness) to promote more sustainable transportation options $1 million over 3 years	Federal	Reduce GHG emissions and other pollutants Increase public awareness	2000-2003
Objective b: To increase use of more efficient and integrated transport systems				
Transit Enhancement	Calgary and Edmonton have identified transit bus renewal and LRT expansion as investment areas in their respective transportation infrastructure investment plans. Funding for these actions has been secured through the new provincial allocation of fuel tax revenue to Edmonton and Calgary $420.5 budgeted	Alberta / Municipal	Reduce GHG emissions and other related pollutants	2001-2005

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
SkyTrain Expansion	The Province has committed $1.167 billion to extend Greater Vancouver's rapid transit SkyTrain line, linking Vancouver to Coquitlam and New Westminster, and purchase 60 new SkyTrain vehicles, as the result of a June 1998 agreement with Bombardier Inc. Completion of the first phase is expected in 2002 with the final phase completed in 2000 or another year $1.167 Billion	British Columbia	Reduce GHG emissions	2000-2001
High-Occupancy Vehicle (HOV) and 'Bus Only' Lanes	Approximately $21 million is anticipated to be spent in fiscal year 2000-01 on HOV lane projects to encourage the use of buses, van/carpools and other high-occupancy vehicles in the Lower Mainland $21 million	British Columbia / Regional Governments	Reduce GHG emissions	2000-2001
Cycling Network Program	The Province invests $2 million annually to aid the development of cycling infrastructure in BC communities. Projects eligible for Cycling Network Program grants are 50/50 cost-shared with local governments $2 million	British Columbia / Local Governments	Reduce GHG emissions	2000-2001
Intelligent Transportation Systems	ITS measures such as: incident management, adaptive signal control systems and traveller information are facilitated through provincial funding $4.38 million budgeted	Alberta / Municipal Governments	Reduce GHG emissions and other related pollutants	2001-2005
Canada Infrastructure Program	To provide support for municipal infrastructure projects, cost-shared between federal, provincial and municipal governments. Focus is on green infrastructure and eligible projects include transportation such as public transit and clean fuel buses	Federal / Provincial / Municipal	Up to $2 billion federal to be matched by provincial and municipal governments (total up to $6 billion)	2000-2005
Short-line Railway Advisory Program	Provide advice to groups interested in setting up short line railways as alternative to trucking of grain	Saskatchewan	Reduction in grain transportation costs Reduce GHG emissions	2000 –2003

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
			Increased number of short line railways	
Increased Support for Passenger Rail	Increased funding provided to VIA rail to purchase more efficient equipment, improve track and systems, and expand service $400 million over 5 years	Federal	Increase inter-city rail travel Reduce GHG emissions and other pollutants	2000-2005
Objective c: To promote increased fuel efficiency and use of less carbon-intensive fuels				
Motor Assisted Bicycles	Legislation was passed this year that will encourage people to use motor-assisted bicycles as an alternative mode of transportation. These bicycles are fitted with an accessory motor kit for use up hills or when needed. Under the amendment to the Motor Vehicle Act, people riding motor-assisted cycles will not need vehicle registration, licences or insurance	British Columbia	Reduce GHG emissions	2000-2001
Fleet Replacement and Maintenance	Promote fleet replacement and maintenance, and other operational issues	Newfoundland	Reduce GHG emissions	Ongoing
Trucking Partnership program	Increased hauling weights and lengths	Saskatchewan / Private	Reduce energy use per tonne-km	Implementation year 2000-2003
Objective d: To improve the understanding of how climate change could affect Canada's transportation systems				

Actions Under Consideration (Policy/Budget Approval Needed)

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a: To encourage behavioural changes				
Transportation Awareness Collaborative	Establish a province-wide coordinating committee to deliver climate change transportation-related public education & outreach initiatives and possible implementation of other transportation initiatives	British Columbia	Reduce GHG emissions	
Community Pilots: Transportation Strategies and Technologies	A select number of showcase pilots will be created to demonstrate and evaluate a range of strategies and technologies with the potential to reduce urban transportation emissions	Federal / Provincial / Municipal	Reduce GHG Emissions	Year 1 (i.e. 2001) Establish criteria for pilots Consult with provinces and municipalities Request for proposals and selection of

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
				pilots. Years 2-4: Pilots test and evaluate range of measures
Freight Efficiencies and Technologies	The Voluntary and Technology Demonstration Program will support the introduction of new, more fuel-efficient technologies and operating practices and to increase the efficiency of the transportation system within each freight sector. Programs will include awareness, technology demonstration, recognition and possible negotiation of MOUs or voluntary initiatives with the transportation industry	Federal / Transportation Industry Associations	Reduce GHG emissions and other air pollutants Operations and technological improvements	2001-2005
Improve Telecommunication to Reduce Travel	Improve availability of telecommunication facilities to reduce the need for travel	Joint Public / Private Nova Scotia	Reduce GHG emissions	
Increase Use of Telecommuting by Government Employees	Increase use of telecommuting by government employees	Nova Scotia	Reduce GHG emissions	
Optimize Business Practices	Reduce business – related travel by options such as telecommuting	Newfoundland	Reduce GHG emissions	To be considered in 2001 – continuous thereafter
Driver Education / Outreach and Awareness Program	To cover all aspects of vehicle ownership and operating relating to energy efficiency. It would be directed at passenger, freight and off-road sectors	Alberta / NRCan	Reduce GHG emissions and other related pollutants	2001-2005
Objective b: To increase use of more efficient and integrated transport systems				
Amtrak	Negotiations of a proposed passenger rail service expansion between Vancouver and Seattle	Public / Private British Columbia	Reduce GHG emissions	
Intelligent Transportation System (ITS)	Synchronized traffic signals Improving traffic flow through intersections reduces vehicle emissions by minimizing idling times at red lights	Prince Edward Island	Reduce GHG emissions	2000-2003 Consult with the federal government
	Adaptive traffic signals for main routes through Charlottetown Improves traffic flow and reduces idle times	Prince Edward Island	Reduce GHG emissions	2002-2003 Consult with the federal government

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
	Advanced traveller information program A traveller information system that distributes information on weather, road conditions, construction zones, detours, and congestion to result in more efficient travel patterns	Prince Edward Island	Reduce GHG emissions	2002-2003 Consult with the federal government
	Road Weather Information System (RWIS) fleet management for road maintenance Enhances highway maintenance decision- making ability, leading to more efficient use of the highway maintenance fleet	Prince Edward Island	Reduce GHG emissions	2000-2003 Consult with the federal government
Improved Transportation Infrastructure	Improved highway surfaces and signals to improve traffic flow	Joint Saskatchewan / Municipal initiative	Reduce GHG per vehicle-km	2001-2003 Consult with the federal government
	Improve transportation infrastructure to increase efficiency and reduce emissions	Joint Public / Private Nova Scotia	Reduce GHG emissions	
Integrate Transit Development and Planning	Integrate transit development and planning into community development and land use planning	Newfoundland	Reduce GHG emissions from improved transportation infrastructure	To be considered in 2001 – continuous thereafter
Objective c: To promote increased fuel efficiency and use of less carbon-intensive fuels				
Automobile Fuel Efficiency Improvement and Expanded Consumer Labelling and Awareness Program	Intention to work with industry and the U.S. government to achieve new vehicle fuel efficiency target by 2010 Launch a new Drive Green awareness program which would include: expanded vehicle testing of new technology vehicles, improved labelling of automobiles, consumer education on vehicle purchases and driving behaviour	Federal	Reduce GHG Emissions	2001: begin work with industry and the U.S. on target Launch Drive Green program 2001-2003: negotiations with stakeholders 2004: improvements begin to be seen 2010: target is reached
Consultation on Options to Reduce GHG from Light Trucks and Passenger Vehicles	Province is consulting with stakeholders to identify and evaluate options to reduce GHG emissions from passenger vehicles and light trucks.	British Columbia	Reduce GHG emissions	

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
	including the option of a feebate system based on vehicle fuel efficiency			
Vehicle Scrappage Pilot Program	Under the program, Calgary citizens would receive an incentive of either a free 1-year transit pass or a $500 credit for a newer used or new car to retire their pre-1981 cars for scrappage This program will serve as a public awareness tool regarding the environmental impact of older vehicles and determine the potential impact, costs and feasibility of a province-wide vehicle scrappage program	Alberta	Reduce GHG emissions and other related pollutants	2001
Long-Term Tax Policy for Alternative Fuels	A Province is implementing a long-term general tax policy for all alternative motor fuels. Under the policy, tax rates on alternative motor fuels will be phased in, based on market share and environmental benefits, with the maximum tax rate below the gasoline tax rate. This will provide suppliers and consumers of alternative fuels with certainty that alternative fuels will receive preferential tax treatment over the long-term, to encourage the development and distribution of these fuels and the purchase of alternative-fuel vehicles	British Columbia	Reduce GHG emissions	
Alternate Fuels	Determine the most effective manner in which alternative these fuels can play an increasingly positive environmental and economic role in Alberta	Alberta	Establish a foundation to move to less carbon intensive fuels, and thereby reduce GHG emissions	2001-2005
Low Emissions Transit Bus Pilot Project	Under this program, Alberta Urban municipalities would have the opportunity to test market innovate, fuel efficiency bus technology	Alberta / Municipalities	Reduce GHG emissions and other related pollutants	2001-2005
Increase Ethanol Production	Encourage construction of new biomass-based ethanol plants in Canada A Task Force under the Council of Energy Ministers will explore options to support ethanol production, including removal of barriers for out-of-province	Federal / Provincial	Reduce GHG Emissions Reduce emissions of carbon monoxide	2000-2004

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
	ethanol and the nature of fuel tax exemptions. A public education component will be added to "Drive Green" program to increase public acceptance of ethanol			
Fuel Cell Partnership	Provide support to develop and encourage the fuelling infrastructure needed for fuel cell vehicles coming on to the market in the next 4-5 years and address other regulatory barriers	Federal / Energy Industry / Fuel Cell Industry / Provinces	Reduce GHG emissions and other pollutants	Initiate in 2001
Green Fleet	Consider converting part(s) of Government fleet	Newfoundland	Reduce GHG emissions	To be considered in 2001 – continuous thereafter
Objective d: To improve the understanding of how climate change could affect Canada's transportation systems				

B) Cross-Sectoral Actions: Framework and Partnership Actions

Broader action by all Canadian sectors is required to reduce climate change risks through mitigation and adaptation. As is evident in the review of the sectors, there has been consistent progress by the private sector in reducing emissions intensity, in increasing energy efficiency and productivity, in exploring new arrangements for reductions, and in offsets and emissions reductions trading.

In addition to identifying opportunities within specific sectors, federal, provincial and territorial governments have identified strategic opportunities to encourage action across a number of sectors, and to encourage communication and cooperation across those sectors to stimulate greater recognition of opportunities to invest in cost-effective emission reduction and offsets.

This builds on existing partnerships to encourage emission reductions, such as the Voluntary Challenge and Registry Inc. (VCR Inc.), *ÉcoGESte*, the Canadian Industry Program for Energy Conservation (CIPEC), the Greenhouse Gas Emission Reduction Trading (GERT) pilot and the Pilot Emission Reduction Trading system (PERT).

Economically attractive opportunities continue to exist to sequester carbon and control other GHG emissions. A baseline protection system is necessary to remove a barrier to voluntary action. The baseline protection system will provide organizations and individuals with the assurance that eligible voluntary actions will be credited against certain future policy options.

Even with an effective baseline protection program and the removal of other barriers to action, Canadians are unlikely to make significant investments to reduce GHG emissions or sequester carbon unless they can make a business case for such investments. It, therefore, may be necessary in future business plans to consider the provision of some type of economic inducement to make such investments. In preparation for this, it is necessary to introduce some pilot market initiatives that will inform and provide valuable experience in developing, introducing and operating broader market.

Access to the "Kyoto Mechanisms" — clean development mechanism (CDM), joint implementation (JI) and international emissions trading — both contribute to global reductions and reduce the costs of achieving domestic reduction objectives. CDM/JI project participation may come from a variety of sectors including agriculture, buildings and construction, electricity, oil and gas, forestry, manufacturing and industrial processes, and transportation. These mechanisms provide Canadian firms with additional entry points into foreign markets for climate friendly technology and investments.

Supporting actions include negotiating international rules, which enhance international trade and investment through minimizing cost and regulatory barriers. Canadian governments will promote Canadian participation internationally, through contacts and negotiations with foreign governments and embassy support. Domestically, governments will work with interested Canadians to improve understanding, contacts, best practices and efficient procedures.

Objectives and Supporting Action

a) To enhance frameworks encouraging voluntary commitments, action and results

b) To remove policy barriers to voluntary GHG emission reductions

c) To encourage and support trading of voluntary GHG emission reductions

d) To assist in positioning Canadian companies to compete internationally to export technology and invest in international GHG reductions/offsets and registering them in Canada

e) To facilitate multi-sectoral partnerships to promote communication, best practices, cross-sectoral demonstration and pilot projects, and cross-sectoral investment

The preceding objectives, and the expected results from actions approved and underway and those under consideration, are described more fully in the following sections:

Objective (a) To enhance frameworks encouraging voluntary commitments, action and results

a) Enhance Voluntary Action

There is considerable scope for enhanced voluntary action to make an important and cost-effective contribution to reducing, sequestering and offsetting Canada's emissions of GHG.

To date, Canada's voluntary climate change programs have been focused mainly on encouraging large organisations — corporations and governments — to commit to taking actions to reduce either their energy consumption or their GHG emissions. Experience with other voluntary programs has taught that to be effective such programs must be supported and allowed to evolve with experience and to suit the stage of readiness of the targeted audience to participate. The next step in the evolution of Canada's existing voluntary climate change programs will involve improving further build their credibility and measured effectiveness in reducing emissions. There is now a need to further enhance these programs and focus them on encouraging Canadian organisations to: publicly commit to taking significant and effective actions; set performance goals; take the actions; measure and report the results with respect to their performance goals; and then pursue further action opportunities.

The federal government and many provincial and territorial governments, have been successful in voluntarily reducing energy consumption and emissions from their own operations and have reported their related activity to either the VCR Inc. or *ÉcoGESte*. There is a need for these governments to: continue their clear and sustained leadership by setting continuously improving examples (see Section III c – Broad Themes, Governments Leading by Example); making the needed resources available to support and enhance the programs; as well as encouraging, recognizing and championing voluntary action by all Canadians.

Objectives and Supporting Actions

a i) To enhance the engagement of the private sector in existing voluntary emission reduction programs

a ii) To enhance the profile of voluntary emission initiatives

a iii) To secure further GHG emission reductions on a voluntary basis

Results Anticipated

Enhancing voluntary actions is attractive because doing so:

- will engender the partnership approach that is necessary to support the widespread behavioural change and innovative responses that will be required to significantly reduce or offset the nation's GHG emissions;
- can be done in concert with, or at least not in conflict with, the pursuit of economic growth and other societal goals;
- allows the constructive engagement of the people who know their own business best;
- reinforces and is reinforced by, the Enhancing Awareness and Understanding objective "To encourage and motivate Canadians to take personal and corporate action to reduce GHG emissions" (see Section IIIa – Broad Themes: Enhancing Awareness and Understanding); and

- builds on and helps to increase the effectiveness of existing programs like the Voluntary Challenge and Registry Inc. (VCR Inc.), *ÉcoGESte* and the Canadian Industry Program for Energy Conservation (CIPEC).

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a i) : To enhance the engagement of the private sector in existing voluntary emission reduction programs				
VCR Inc.	To provide the means for promoting, assessing and recognizing the effectiveness of the voluntary approach in addressing climate change	VCR Inc. / Industry / Federal	GHG and other emissions affected Other environmental impacts	Ongoing
Champions in Action within the Voluntary Challenge and Registry	More rigorous level of voluntary GHG reporting with validation of VCR Plans	VCR Inc.	Increase corporate engagement in reducing emissions Increase credibility of VCR	2000-2001 2001-2002 2002-2003
Encourage Participation under the Voluntary Challenge and Registry Inc.	Encouraging action across sectors	Joint Public / Private Northwest Territories	GHG and other emissions affected Other environmental impacts	Program Implementation Year 1
Objective a ii) : To enhance the profile of voluntary emission initiatives				
Objective a iii) : To secure further GHG emission reductions on a voluntary basis				
Continue with Energy Management Programs	Provide technical advice and assistance to energy consumers in all sectors to reduce their energy consumption	Northwest Territories Joint Public/Private	GHG and other emissions affect, other environmental impacts	2000-2001
Continue to Support the Arctic Energy Alliance	Enable the Alliance to help communities, consumers, producers, regulators, and policy makers to work together to reduce the cost and environmental impacts of energy in the Northwest Territories	Joint Public / Private Northwest Territories	GHG and other emissions affect Other environmental impacts	2000-2003

Actions Under Consideration (Policy/Budget Approval Needed)

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective a i) : To enhance the engagement of the private sector in existing voluntary emission reduction programs				
Objective a ii): To enhance the profile of voluntary emission initiatives				
Statement of Provincial Interest	With municipal input, the Department of Municipal Affairs will investigate developing a Statement of Provincial Interest to address urban design and transportation issues	Nova Scotia		2001-2004
Improved Tracking and Reporting of EE and Emissions Trends	Track and report more comprehensively	Federal	Advice Benchmarking	Years 1-5
Improving Company-Level GHG Management		Federal	Information Advice Benchmarking Audits	Years 1-5
Objective a iii) : To secure further GHG emission reductions on a voluntary basis				
Climate Partners	Support a private sector-led initiative to allow individuals, households and businesses to invest in GHG emission reduction projects and offsets	British Columbia Public / Private	Reduce GHG emissions	

Objective (b) To remove policy barriers to voluntary GHG emission reductions

b) Baseline Protection Initiative

Federal, provincial and territorial governments have implemented the Baseline Protection Initiative as an important step in removing disincentives to take early action on climate change in a changing policy environment. They have also approved the draft rules and information required for Canadians to participate in the initiative.

Baseline Protection is intended to reduce uncertainty for business and to facilitate long-term corporate planning. It ensures that businesses can take early actions to reduce GHG emissions and will not be disadvantaged if future policy actions allocate obligations to reduce GHG on the basis of emissions levels. In the event that a future policy allocates emissions rights or reduction obligations on the basis of emissions levels, Baseline Protection allows businesses and institutions to reconstruct their emissions baselines to include reductions in emissions achieved through investment in early actions.

Baseline Protection builds on the Voluntary Challenge and Registry (VCR Inc.) and *ÉcoGESte*, and the Canadian emissions trading pilots — the Greenhouse Gas Emissions Reduction Trading (GERT) pilot and the Pilot Emissions Reduction Trading (PERT) project. VCR Inc. and *ÉcoGESte* are registries for private and public organizations that have agreed to voluntarily limit GHG emissions. Those taking early actions are encouraged to register their projects with VCR Inc. and/or, in Quebec, *ÉcoGESte*.

Federal, provincial and territorial governments have approved the following draft rules:

- Any Canadian legal entity directly producing GHG emissions from its operations within Canada may register emission reductions for the purposes of baseline protection.
- Emission reductions beginning on or after January 1, 1990 are eligible.
- Eligible emission reductions must be real, measurable and verifiable, where:
  - "Real" means a reduction in actual emissions or the avoidance of an emissions increase that would otherwise have occurred, resulting from a specific and identifiable action by an entity, net of any impacts or effects on emissions outside the entity's operations;
  - "Measurable" means that the actual level of GHG emissions associated with the project or activity can be quantified; and
  - "Verifiable" means that the calculation methodology is acceptable to governments, is transparent and replicable, and the appropriate data required to verify/audit the calculations is available and can be confirmed.

Results Anticipated

It is expected that the Baseline Protection Initiative will reduce the risks of future policy uncertainty and better position industry to incorporate climate change actions into their long-term plans and take actions now to reduce their GHG emissions.

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective b: To remove significant policy barriers to voluntary GHG emission reductions				
Baseline Protection Initiative	see above	Joint Governmental	Reduce risks of future policy decisions	2001

Objective (c) To encourage and support trading of voluntary GHG emission reductions

c) Encourage trading of GHG Emissions Reductions

Prior to any decision on the use of emissions trading to achieve emissions reductions, there is a need to have a better understanding of how a trading system would work in practice. Voluntary participation in trading pilots would be encouraged to this end.

Results Anticipated

The two primary results would be:

- learnings about the issues related to future use of emissions trading and the reduction potential in strategic areas;
- incremental, verifiable reductions in GHG emissions.

Actions Under Consideration (Policy/Budget Approval Needed)

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective c: To provide learnings about reduction potential in specific areas and about issues related to future policy instruments				
National / Provincial / Regional Pilot to Reduce GHG Emissions	Multiple pilot programs to incent and reward incremental actions to reduce GHG emissions	Joint Intergovernmental Federal / Provincial	Industry engagement in reducing emissions Positive signal about the value of emission reductions Increase learning on policy option	2001-2002

Objective (d) To assist in positioning Canadian companies to compete internationally

d) Clean Development Mechanism (CDM)/Joint Implementation (JI)

The Kyoto Mechanisms are of particular importance to Canada. They are expected to lower implementation costs and provide a measure of flexibility as new technologies and behavioural change take root at home. It is estimated that the Kyoto Mechanisms will contribute significantly to the realisation of our reduction target. Domestically, the Kyoto Mechanisms will be a key element in the successful implementation of Canada's national strategy on climate change.

The CDM/JI are the principal mechanisms for international project activities to allow for credit for emission reductions in Annex 1 countries in achieving compliance with their Kyoto target. These projects should also contribute to the sustainable development of non-Annex 1 countries. CDM & JI are important tools to help Canada achieve emission reductions in a cost-effective manner by engaging the private sector in emission reduction opportunities. They could also provide Canada with an additional entry point into foreign markets for climate friendly technology and investments.

Given appropriate decisions at CoP 6, CDM projects will be able to start in 2000. This implies a need to strengthen and accelerate the activities of Canada's CDM/JI Office to accommodate potential demands. The CDM/JI Office will be required to: research, identify and advise on market opportunities; review and approve individual proposals; give advice and guidance to Canadian firms in preparing project proposals; contribute to regional workshops and participate in international workshops and meetings; communicate policy and promote the use of the mechanisms to Canadian industry; negotiate MOUs and liaise with host countries to facilitate projects and realise credits.

CDM/JI projects may come from a variety of sectors including agriculture, buildings & construction, electricity, oil and gas, forestry, manufacturing and industrial processes, or transportation. They may be implemented at federal, provincial, territorial and municipal levels, by companies, NGO's, or government bodies. As such it is important to ensure co-ordination among government departments, industry and NGO's. Provincial/Territorial governments will advise on market priorities and particular Canadian technology strengths.

Result Anticipated

It is expected that by facilitating international climate change projects, the governments will help in providing Canadian industry a level playing field compared to our main trading partners. It would also position Canada to decrease the cost of emissions reductions.

It is anticipated that, following decisions at CoP6, there will be a significant increase in the number of projects.

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective d: To assist in positioning Canadian companies to compete internationally				
Strengthen Capacity to Maximise CDM and JI Opportunities	The CDM and JI Office will: Give advice and guidance to Canadian firms in preparing project proposals; Conduct outreach to Canadian and potential host country industry; Negotiate MOUs and liase with host countries to facilitate projects and realise credits Research, identify and advise on market opportunities	Federal	Assist Canada to achieve its Kyoto targets by obtaining an estimated 100 megatonnes of total GHG reductions by 2012 Environmental and socio-economic benefits and technology transfer to developing countries and economies in transition Contribute sustainable development Allow Canadian companies to achieve low-cost GHG emissions Maintain a level playing field for Canadian companies vis-à-vis their international competitors Access to markets for GHG reduction technology and services	Office operational Impact on total emission reductions is based on the assumption that CDM will be operational in 2000
Workshop on Clean Development Mechanism (CDM) Opportunities with Latin America	A two-day conference bringing together Latin American, Albertan and Canadian companies for CDM business opportunities. The first in a series to promote CDM/JI to Alberta businesses	Alberta / Federal	Increase awareness	2000-2001
Officials Development Assistance	To engage developing countries and encourage partnerships. These partnership will: - help developing countries undertake projects to start reducing GHG emissions; - provide opportunities for Canadian business to sell its world-class technology; - secure cost-effective emission reduction credits to help Canada achieve its Kyoto target; and - help level the playing field to meet the growing world demand for climate-friendly goods and services	Federal / Industry	Reduce GHG emissions in developing countries Increase opportunities for Canadian business Emission credits receives may be used towards the achievement of Canada's Kyoto target	2000-2004

Actions Under Consideration (Policy/Budget Approval Needed)

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective d: To assist in positioning Canadian companies to compete internationally				
Earning International Emission Reductions Credits	Facilitate CDM/JI activity through provision of technical advice, outreach activities and promotion of Canadian climate change technology and increase market opportunities and competitiveness of Canadian firms	Federal / Industry	Increase competitiveness of Canadian firms and maximize credits available to Canada	2001-2005
Workshops on Joint Implementation (JI)/Clean Development Mechanism (CDM)	To promote the use of JI and CDM to Alberta businesses. Several conferences concentrating on JI/CDM opportunities will be held	Alberta / Federal	Increase awareness	2000 – 2002

Objective (e) To facilitate multi-sectoral partnerships to promote communication, best practices, cross-sectoral demonstration and pilot projects, and cross-sectoral investment

e) Facilitate multi-sectoral partnerships

Under this objective, jurisdictions will strive to build and maintain effective partnerships and act as catalysts for municipalities, businesses, institutions and individuals and non-governmental organizations to take effective action on climate change. Actions under consideration include formation of multi-sectoral advisory committees to facilitate the multi-sectoral partnerships.

Results Anticipated

Development of stakeholder advisory committees to facilitate further program development and identification of net GHG reduction initiatives. Increase in the number of initiatives undertaken by multi-sectoral partners.

Actions Approved and Underway

Action Name	General Description	Implementation authority	Impact of Action	Implementation Timing
Objective e: To facilitate multi-sectoral partnerships to promote communication, best practices, cross-sectoral demonstration and pilot projects, and cross-sectoral investment				
Establish and operationalize Climate Change Central	Provide operational funding towards Climate Change Central $6 million (Alberta Government)	Alberta	Innovation, technology, education and public participation	2000-2002

C) Cross Cutting Actions

This section provides a brief overview of three areas that have significant potential in terms of future action to reduce net GHG emissions. They are sinks, geological capture and storage and renewable energy.

a) Sinks

Description

A sink is a process or an activity that removes a GHG from the atmosphere. Carbon dioxide is removed by plants through photosynthesis and stored in forests, croplands, grasslands and wetlands. These biological sinks can be enhanced through selected management practices for forests and farms, such as the use of no-till seeding in agriculture.

Carbon sinks offer a unique opportunity for Canada to offset its rising GHG emissions with a low-cost (possible range: <$1-2/tonne CO_2 equiv.), high quantity (10-40 megatonnes) abatement mechanism. Therefore, sinks have considerable strategic value for Canada in the context of both its national and international climate change discussions. To realize this opportunity, clear and favourable rules are required internationally, while at the national level, governments must develop a sound scientific underpinning coupled with actions that encourage sinks investments.

Considerations

- Forestry (non-industrial aspect) and agriculture are the main sectors affected. Investments in the sinks potential of agricultural soils are occurring both within and outside of Canada, with the private sector trying to demonstrate workable frameworks for utilizing sinks to obtain emissions credits.
- Current international negotiations pertaining to implementation of the Kyoto Protocol may clarify the eligible forest activities that can be considered as sinks, and provide for the inclusion of agricultural soils as a sink.
- The electricity sector has taken a keen interest in investment in sinks options as a means to mitigate its emissions from electricity generation.
- Municipalities have also expressed some interest in sinks in the context of urban forestry.
- Some provincial governments have begun to encourage significant investment in sinks as part of their response to climate change (e.g., under the GERT Pilot, Saskatchewan has sold forestry offsets to SaskPower).
- The Science, Impacts and Adaptation component of the National Climate Change Process has promoted the development of a national strategy to provide the science necessary to make policy decisions in this area.
- Actions to advance the use of sinks are approved and/or under consideration in the Agriculture and Forestry sectors under this business plan.

b) CO_2 Capture and Geological Storage

Description

CO_2 Capture and Geological Storage, in general terms, involves the capture, (additional) treatment, transportation and injection of CO_2 into a suitable geological medium. In this process, CO_2 is first captured from a suitable source, such as an off-gas stream at a petrochemical processing facility or a flue-gas stream from a coal-fired electricity generation facility. The CO_2-bearing gas stream is then treated, as required, to render it appropriate, in terms of purity, pressure and temperature, to the anticipated mode of transportation and/or intended geological storage site. The CO_2 is then transported to the storage site where it is injected into the selected geological medium. Where the geological medium is an oil reservoir, the injection of the CO_2 may have the additional benefit of enhancing oil production. In other cases, such as with saline aquifers, the CO_2 is injected for storage purposes only.

Considerations

- The use of CO_2 for enhanced oil recovery offers the environmental benefit of emissions reduction and the economic benefit of extended production life for several oil fields. CO_2 Capture and Geological Storage can also eliminate emissions of other pollutants (e.g., particulates and NO_x).
- The emissions from sources of carbon dioxide (CO_2) readily amenable to capture and storage (including hydrogen production, natural gas processing and electricity generation) could exceed 75 megatonnes per year.
- The technologies necessary to implement CO_2 Capture and Geological Storage already exist.
- CO_2 Capture and Geological Storage is not equally applicable in all situations. It is most effective and efficient when applied on a large scale to CO_2 produced in large volumes from stationary, single point sources relatively near to suitable long-term storage sites. It therefore has obvious application to CO_2 produced from fossil fuel (particularly coal) fired electricity generation facilities in areas where large storage sites exist (particularly in Alberta and southern Saskatchewan).
- CO_2 Capture and Geological Storage may also be usefully applied elsewhere in Canada, but this needs to be confirmed through additional work.
- It would also be applicable to CO_2 produced by steam methane reforming at hydrogen plants and fertilizer plants, and to CO_2 separated from natural gas streams at natural gas processing facilities and ethane purification and ethylene production plants.
- Key objectives and priorities for future action are:
    a) To ensure, through government/industry partnerships, that geological capture and storage is a viable option for reducing Canada's CO_2 emissions;
    b) To undertake the necessary preparatory work, including addressing regulatory and fiscal barriers, and developing inventories of suitable source and storage sites;
    c) To support the expanded use of geological capture and storage in Canada, beginning with CO_2-based enhanced oil recovery, and proceeding to "flue" gas type sources and CO_2-enhanced coal bed methane recovery; and

d) For governments and industry to co-operate closely in advancing CO_2 Capture and Geological Storage.

- Actions to advance the use of geological capture and storage are approved and/or under consideration in the Technology, Electricity and Industry (Oil and Gas) sections of this business plan.

c) Renewable Energy

Description

"Renewable" energy can be defined as energy derived from renewable resources: wind, water, sun, earth, residues and biomass, and includes two specific features: self-generation by cycle and not depleted. To generate electricity, heating or air-conditioning the following types of renewable energy sources are generally considered: hydroelectricity, wind energy, solar energy, geothermal energy and bioenergy. Liquid biofuels (such as ethanol and biodiesel) are also considered renewables since they can be derived from sustainable biomass sources.

Considerations

- The advantage of using renewable energy sources stems from the fact that they arise as part of a renewable carbon cycle and thus result in low carbon emissions. Fuel-switching to renewable energy can make a significant contribution towards meeting climate change objectives.
- Large scale production of power using wind, water, solar or biomass sources could partially offset fossil-fuel generated electrical power. Large scale production of liquid fuels using biomass (such as ethanol) could replace some of the fossil fuels used in transportation.
- Bioenergy products from agricultural and forestry biomass and waste products are renewable energy sources. Biofuels include liquid fuels such as ethanol, methanol, biodiesel (vegetable oil methyl esters) and wood pyrolysis oil. Land fill gas (LFG) can also be included in the 'bio' categories.
- From the feedstock production stage (forestry and agriculture sectors) to energy utilization (manufacturing, transportation and energy sectors), advancing bioenergy provides many opportunities for various sectors.
- Most of these renewable energy sources yield lower GHG emissions than gasoline and other fossil-based fuels, on life-cycle basis, and are therefore attractive measures for many sectors to help meet emissions reduction targets. To capture a significant portion of the market, hurdles related to costs (relative to fossil fuels), lack of infrastructure and technical challenges must be overcome.
- Actions to advance the use of renewable energy are approved and /or under consideration in the Agriculture, Buildings, Electricity, Municipalities and Transportation sectors under this business plan.

APPENDIX A

CANADA'S GHG EMISSIONS — CURRENT AND PROJECTED

Canada's greenhouse gas emissions in 1998, the most recent year for which figures are available, were equivalent to 692 megatonnes of carbon dioxide (CO_2). This number is 13% higher than the 1990 level of 612 megatonnes and 20% higher than the Canada's Kyoto target of 575 megatonnes.

Factors affecting emissions growth in recent years include increases in coal consumption for electricity generation, growth in fossil fuel production, largely for export, and increases in Canadian transportation energy consumption.

Greenhouse gas emissions in this country are projected to be 764 megatonnes in 2010, in the absence of new (post-1999) policy and program initiatives by governments in Canada. This estimate would need to be reduced by 25 percentor Canada to meet its Kyoto target (The previously announced gap estimate of 26 percent has been revised to reflect the recent changes to the 1990 emissions level).

Higher emissions from fossil fuel production account for more than half of the projected increase to 2010. Emissions from transportation and electricity are the next largest contributors.

APPENDIX B

JURISDICTIONAL ACTION PLANS

(please refer to the National Climate Change Process Web site at www.nccp.ca)

National
Climate
Change
Process